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"Sediment Characteristics of Selected Coastal Environments"

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Project Overview

A collaborative effort between the University of South Florida (Department of Marine Science and Center for Ocean Technology), the Naval Research Laboratory at Stennis Space Center, and Florida Atlantic University (Department of Ocean Engineering) has acquired, processed and interpreted a substantial acoustic and physical database of the sediments from several nearshore areas around Florida (Fig. 1, Table 1, Appendix A). The main objective of the collaborative effort is the characterization of the acoustic, physical and geological properties of sediments using high resolution subbottom vertical-beam and side-scan sonar data in geologically distinct shallow marine environments. These data are being compared to the geoacoustic properties of the sediments (shear and compressional wave velocity, and shear modulus), physical properties (density, porosity, void ratio, grain size) and mineralogy as measured *in situ* and in the laboratory setting.

The data reveal relationships between geological, physical, and geoacoustic properties of sediments in shallow marine settings and increase our understanding of sedimentary acoustic controls and nearshore seabed variability. Sites were chosen to yield significant contrasts in energy regimes, wave climate, sediment mineralogy and texture, underlying bedrock control, and benthic biological communities. These areas include (1) the Boca Raton nearshore environment on the Florida east coast (Mallinson et al., 1995), (2) the Dry Tortugas and Marquesas inner continental shelf environments ("Keys" in Table 1) (Lavoie et al., 1995; Briggs et al., 1995; Furukawa et al., 1995; Richardson and Griffin, 1995; Stephens et al., 1995; Tooma and Richardson, 1995), (3) the Indian Rocks Beach (IRB) nearshore environment (Locker et al., 1995; Harrison et al., 1995), and (4) the Lower Tampa Bay (LTB) estuarine environment.

Data are being used for empirical modeling of the acoustic data with respect to the physical properties of the sediments (Lavoie et al., 1995; Briggs et al., 1995), and are being applied to the development of a predictive properties database for remote acoustic

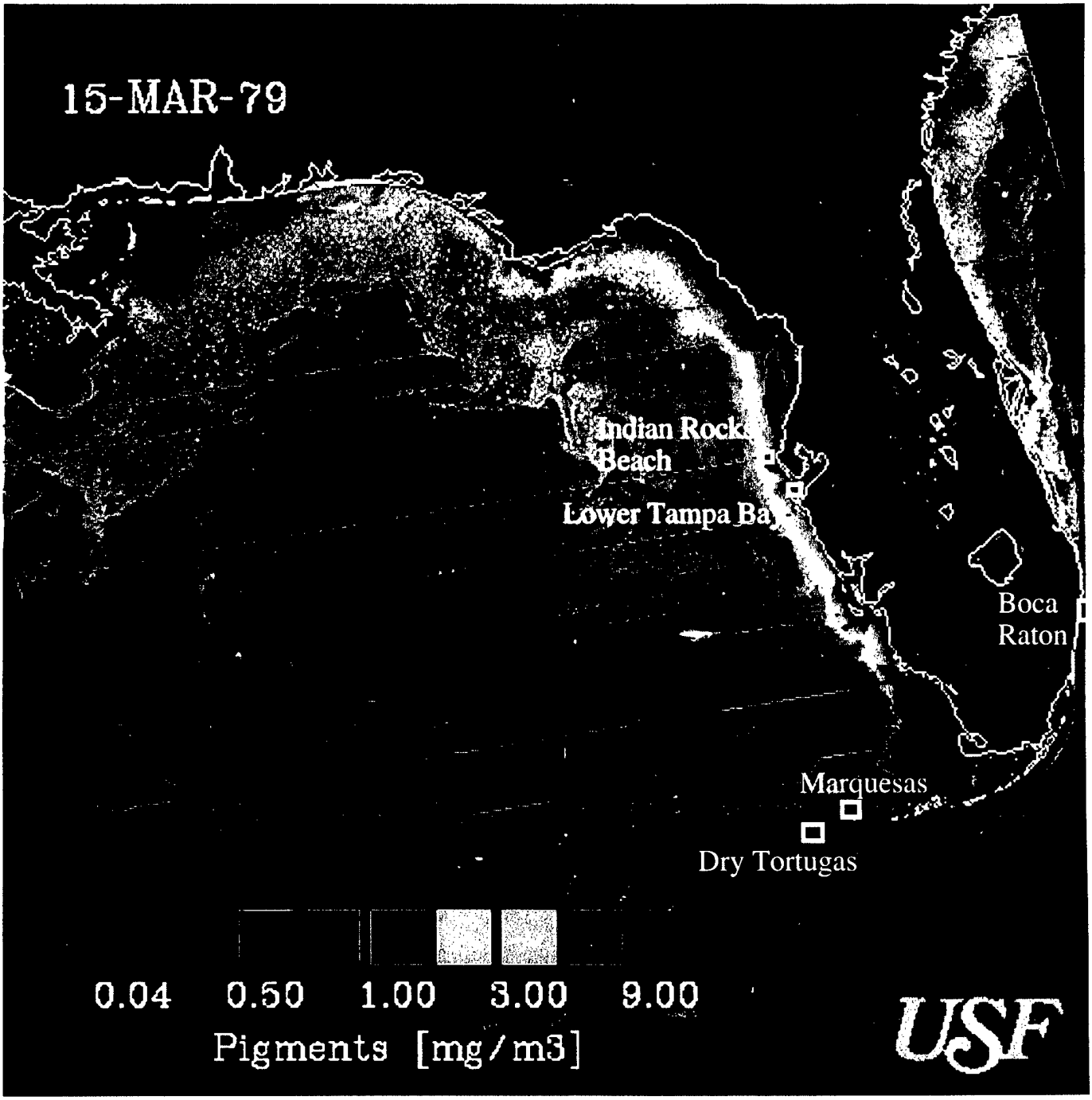


Figure 1. Coastal Zone Color Scanner imagery showing the Florida coastline, chlorophyll concentrations in Gulf of Mexico and Atlantic waters, and the location of sites investigated in the collaborative effort between the University of South Florida, Florida Atlantic University, and the Naval Research Laboratory.

sediment classification by impedance inversion (Fig. 2) (Panda et al., 1994). Development of the sediment classification algorithms based on these data, to be used in conjunction with chirp sonar, is being performed at FAU under the guidance of Dr. Steven Schock. An additional important aspect of these data is the identification and quantification of seafloor variability (bathymetry, sediment grain size, mineralogy, bedforms, acoustic properties) in these nearshore environments in order to define test bed sites for Autonomous Underwater Vehicle (AUV) deployment and calibration (Fig. 2).

Table 1. Data acquired from sites. IRB denotes Indian Rocks Beach. LTB denotes Lower Tampa Bay. Core types include diver cores (d), gravity cores (g), and vibracores (v).

database	Boca Raton	Keys	IRB	LTB
seismic		120 km	370km	
side scan	15 km	120 km	370km	
chirp vert. beam	50km	>100 km	225km	150km
ISSAMS/DIAS*	√	√	√	√
cores	35(d)	60(g)	9(d), 3(v)	8(d)
bottom roughness	√	√	√	

*In Situ Sediment Acoustic Measurement System / Duomorph In Situ Acoustic System

Methods

An EG&G vertical beam chirp sonar with a swept range of 2-10 kHz was used to acquire shallow subbottom data. Chirp data were processed using X-star software. Reflection coefficients were recorded in decibel (dB) format. The decibel data are a measure of the amplitude of the acoustic return relative to the incident amplitude and are on a negative scale. Decibel data are related to the reflection coefficient (R) by a 20Log_{10} scale ($dB = R*20\text{Log}_{10}$ or $R = 10^{dB/20}$). Side scan sonar surveys were conducted at 100 kHz using an EG&G model 272 dual frequency (100/500 kHz) towfish, an EG&G 260 thermal plotter, and a 380 digital tape recorder. All data were acquired using differential GPS for navigation. Digital side-scan sonar data and vertical-beam chirp sonar data have been processed using a combination of software packages including GMT (Generic Mapping Tool), WHIPS (Woods Hole Image Processing Software) and Arc-Info to provide a three-

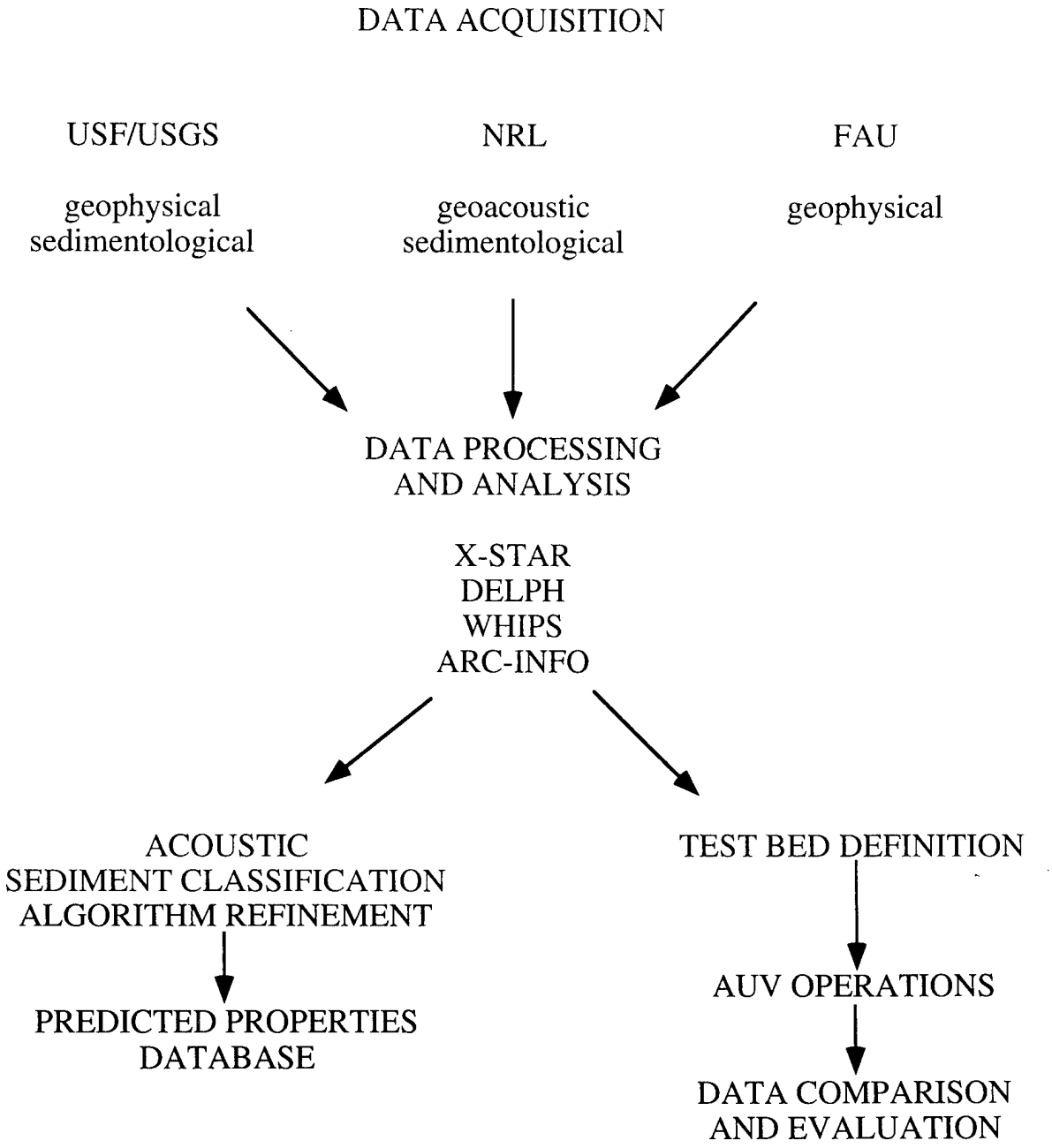


Figure 2. Flow diagram illustrating the components of the collaborative investigation between University of South Florida (USF), USGS (U.S. Geological Survey), NRL (Naval Research Laboratory) and FAU (Florida Atlantic University).

dimensional data base. Seismic data were acquired using a high-resolution, single channel, digital seismic system consisting of a Huntec electromagnetic transducer (boomer), ITI 10 channel streamer, and an Elics Delph2 processing unit.

Acoustic velocity and attenuation, bulk density and porosity were all determined on cores using a Geotek multisensor electric logger. Cores have been analyzed for acoustic velocity, grain size, bulk density, porosity, and mineralogy. *In situ* geoacoustic data consist of compressional and shear wave velocities and sediment rigidity measured with the ISSAMS (*In Situ* Sediment Acoustic Measurement System) and the DIAS (Duomorph *In Situ* Acquisition System) probes, respectively, both provided by Stennis Naval Research Laboratory.

Grain size analyses were performed by first bleaching the sediment with a 5.25% Na-hypochlorite solution to remove organics, then wet sieving with a 3% Na-metaphosphate solution at 63 microns to separate the sand and gravel fractions from the silt and clay fractions. The >63 micron fraction was dry sieved at 1 phi intervals. The <63 micron fraction was ultrasonicated for 15 seconds and analyzed using a Sedigraph 5100 and MasterTech automatic sampling device. Mean grain size was determined by the graphic mean method after Folk (1980).

Carbonate mineralogy of bulk sediments was determined by x-ray diffraction (XRD) analyses using a Scintag XDS-2000 x-ray diffractometer. Samples were step scanned at 0.001° intervals with a count time of 2 seconds from 25.5° to 31.5° 2-theta. Peak areas were determined for the aragonite 111 peak, and the 104 peak for low-Mg calcite (LMC), high-Mg calcite (HMC) and dolomite, using a Gaussian peak-fitting routine included with the XRD software. Areas were converted to weight percentages by using regression equations derived from analyses of in-house standards. Weight percent quartz was determined by HCl insoluble residue analyses of the bulk sediment.

SECTION I. DRY TORTUGAS STUDY AREA

Geologic Framework

The Dry Tortugas are situated on the South Florida margin, and occupy a transitional zone between the south and east facing rimmed margin (to the east) and the west facing ramp margin (to the north). The study area is a low-relief basin bordered to the north and west by the Holocene reefs of the Dry Tortugas, and to the south and east by a bathymetric high with some reef development (Figs. 3-5). The Holocene reefs which comprise the Dry Tortugas are approximately 14 meters thick, are composed of massive head corals such as *Montastrea sp.*, and are situated upon an antecedent high of the Key Largo Limestone, a Stage 5e (~125 ka) reef also composed of massive head corals (Shinn et al., 1977). The reefs surrounding the study area represent windward reef margins in regards to their orientation relative to the dominant wind and wave energies (Hine and Mullins, 1983). Tidal energy is also important in the study area with exchange occurring between the southwest Florida Shelf (Gulf of Mexico waters) to the north, and the Florida Straits to the south (Shinn et al., 1990). Strong tidal currents flow between the carbonate banks of the Dry Tortugas, especially through Southeast Channel at the northern end of our study area, and between the Dry Tortugas and Rebecca Shoal to the east (Fig. 3).

Maps of the geologic framework based on chirp sonar data include bathymetry (Fig. 5), a structure contour map of the surface of the Pleistocene Key Largo Limestone basement and sediment isopach (Fig. 6a,b). Water depth ranges from approximately 18 to 25 meters across the study area. The depositional basin deepens to the southwest and shoals rapidly in the northwest and northeast corners of the study area as the Holocene reef tracts are approached. The surface of the Key Largo Limestone, on average, has less relief than the present seafloor, but also deepens slightly to the southwest. Most of the surface is between 20 and 27 meters below present sea level. The shoal body forming the southern boundary to the study area shows relief of 4 to 6 meters above the back basin (Fig. 6a).

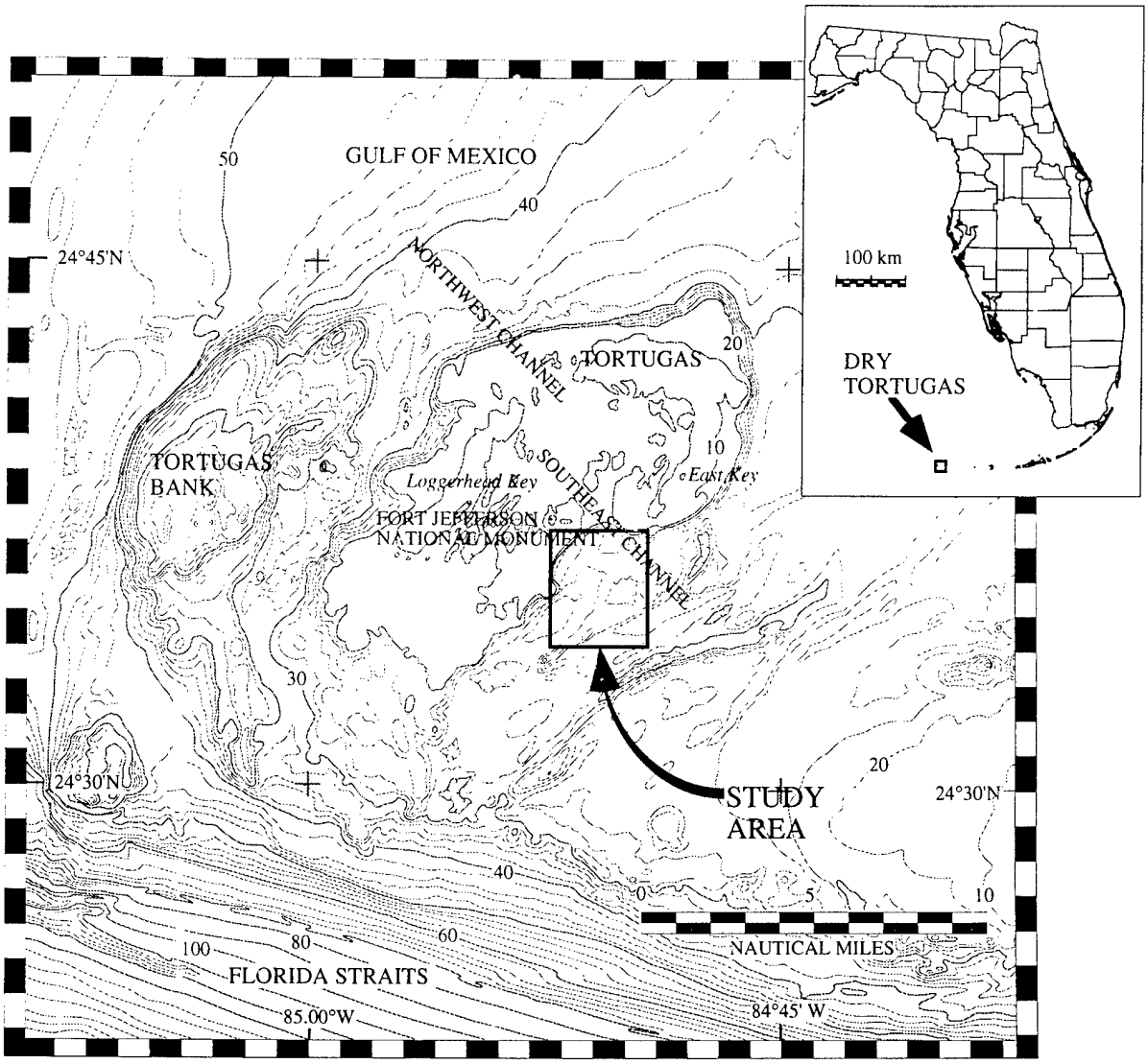


Figure 3. Bathymetric chart showing the location of the Dry Tortugas site. Contour interval is 2 meters.

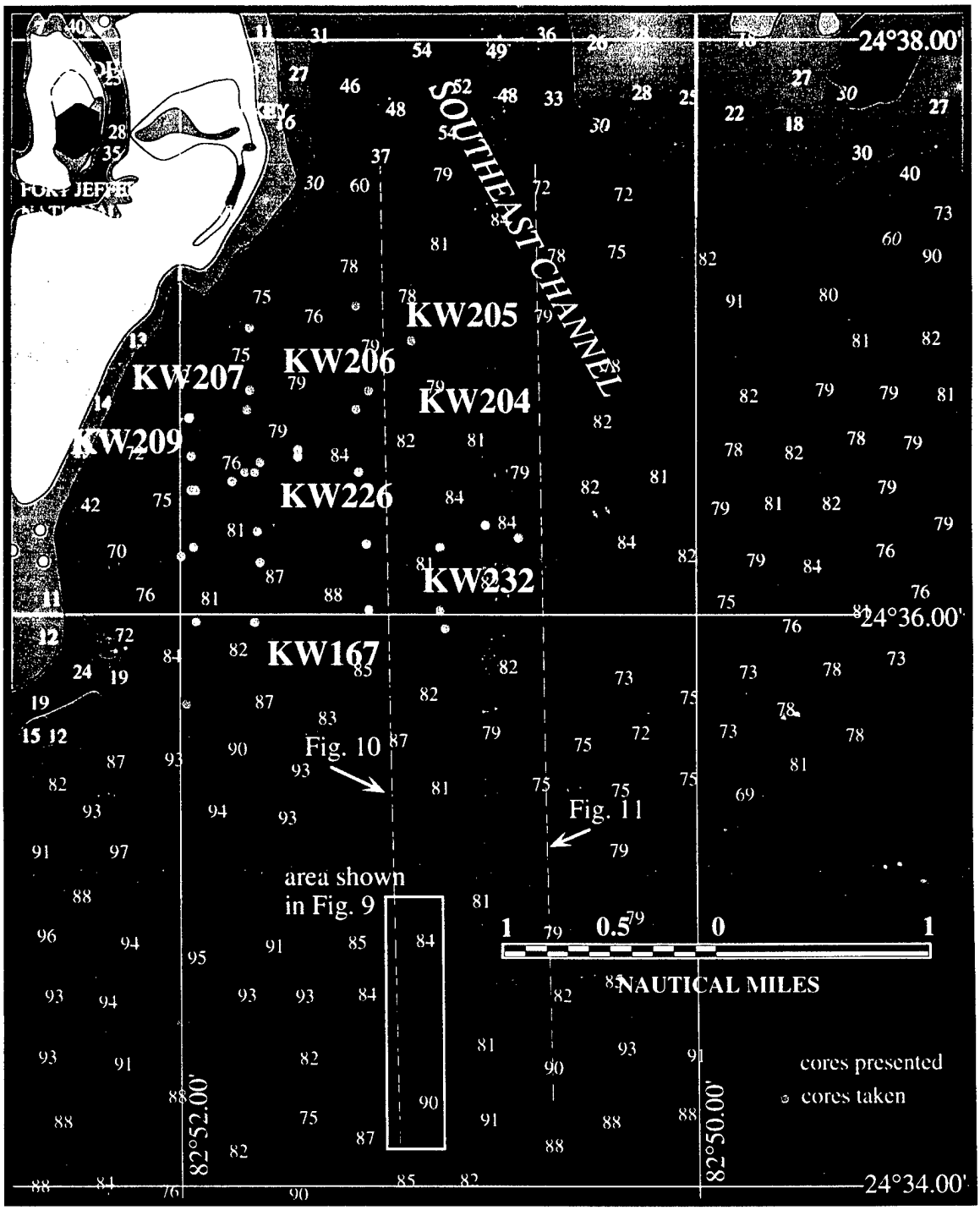


Figure 4. Color bathymetric chart showing locations of gravity cores acquired in the Dry Tortugas area, location of side-scan sonar data presented in Figure 9, and the locations of seismic transects presented in Figures 10 and 11. Soundings are in feet.

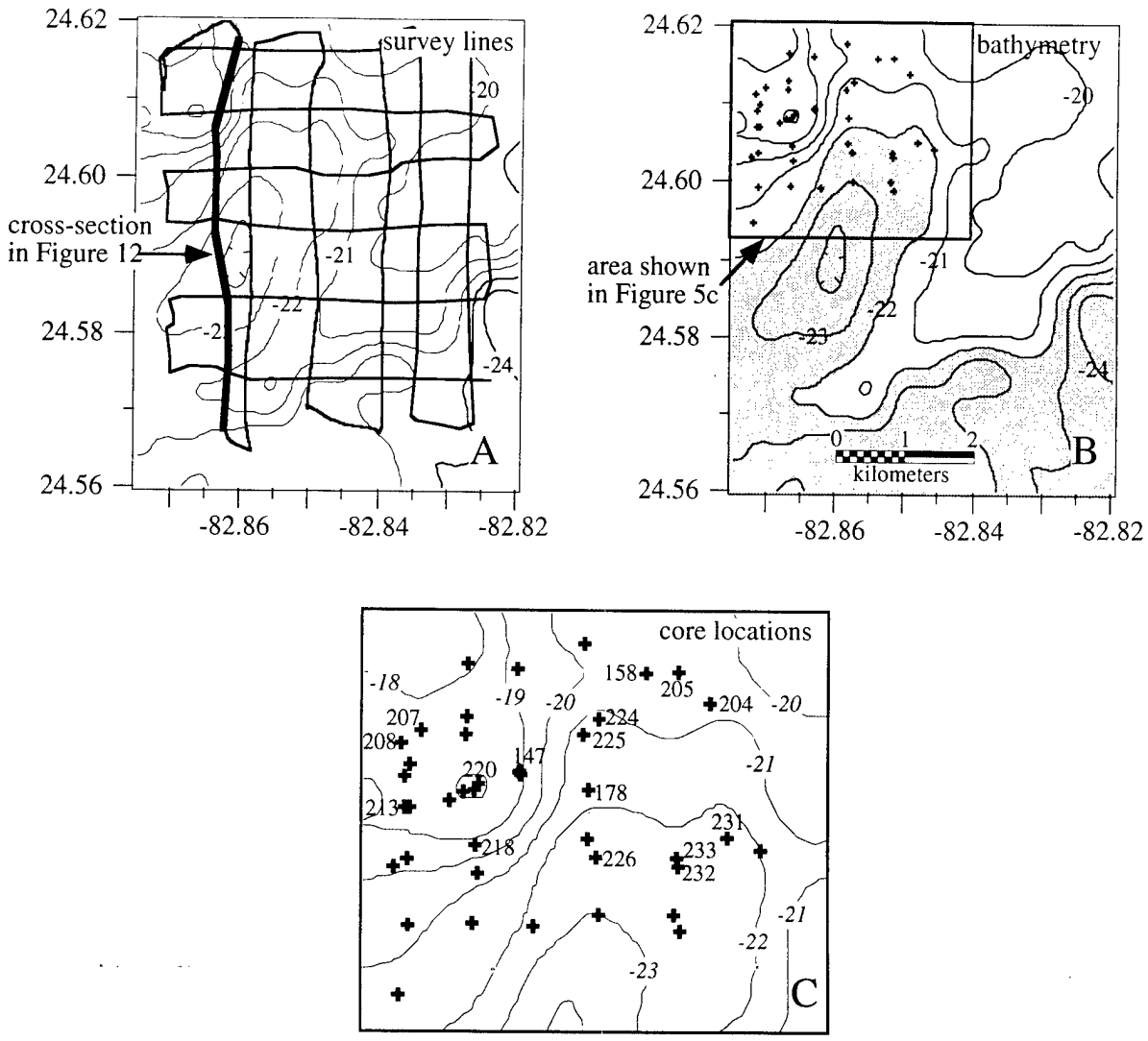


Figure 5. a) Bathymetric chart of the study area showing chirp sonar survey lines. b) Bathymetric chart produced from chirp sonar data using bathymetry along the survey lines shown in Figure 5a Bathymetric data are radially interpolated between data points using a weighted least squares algorithm. Gravity core locations are also shown. Contours are in meters. c) Enlargement of outlined area in Figure 5b showing gravity core locations. Cores presented in other figures in this report are labeled.

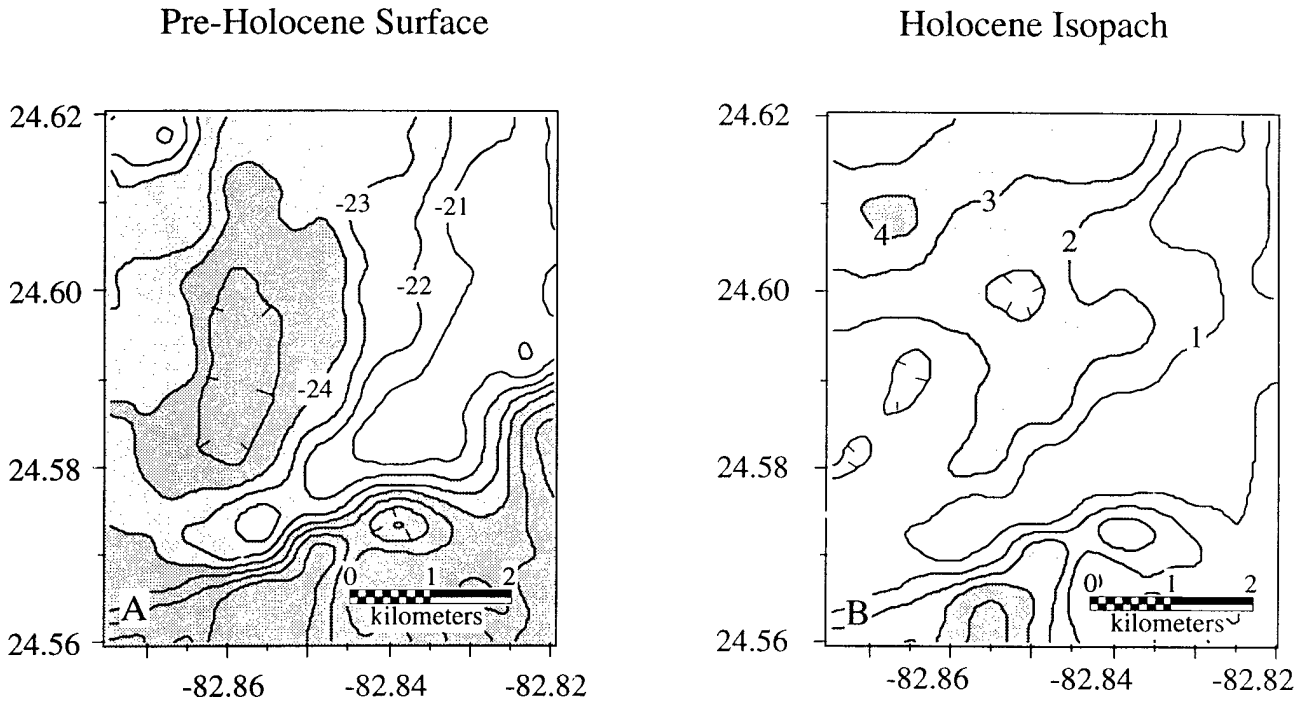


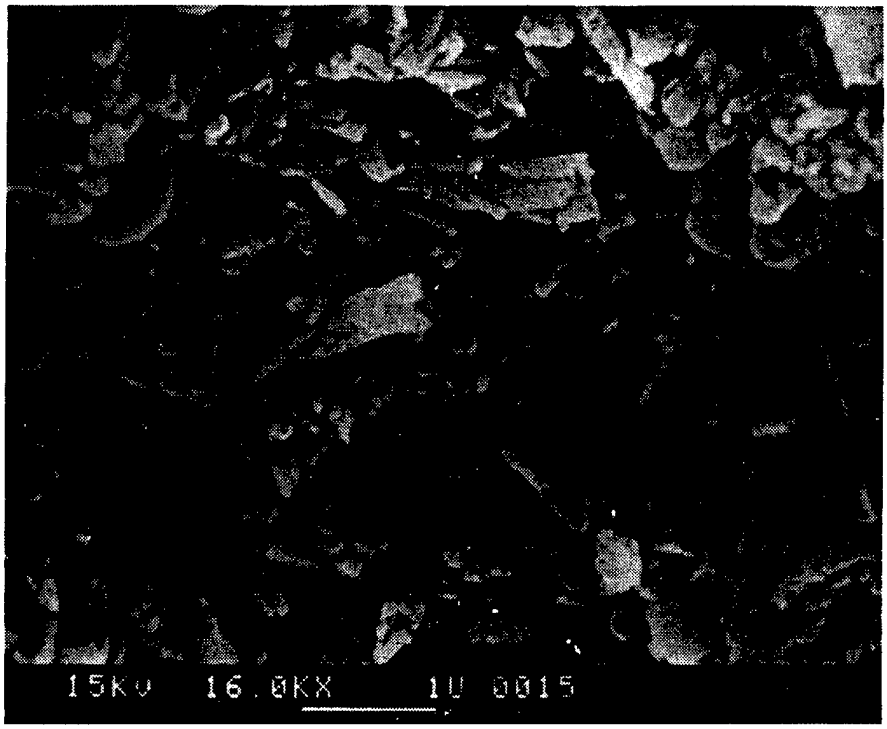
Figure 6. a) Shaded contour map of reflector ε interpreted as the unconformity separating Stage 5a sediments from Holocene sediments. Data were acquired by chirp sonar along survey lines shown in Figure 5a. Data are radially interpolated between survey lines using a weighted least squares algorithm. Contours are in meters below mean sea level. b) Isopach map of the Holocene sediment within the study area. Data were acquired by chirp sonar along survey lines shown in Figure 5a. Data are radially interpolated between survey lines using a weighted least squares algorithm. Contours are in meters.

Holocene sediments attain their maximum thickness (5 meters) near the northern and eastern boundaries of the study area, south of the mouth of Southeast Channel and adjacent to the modern reef tracts (Fig. 6b). Depositional packages thin southward and lapout onto the basement high at the southern boundary. South of the exposed limestone basement high, sediments fill a trough which may be a Stage 5a tidal channel. Seismic data reveal that the shoal body is stratified and reflectors are truncated by the channel feature.

Mineralogic-Petrologic Framework

Sediments within the study area are carbonate sandy muds and muddy sands (Appendix A). The sediments are, on average, approximately 97% carbonate, with quartz, biogenic silica, and organic matter comprising the remainder. Mineralogically there is little variation downcore or across the depositional area. Sediments are dominated by aragonite (mean = 54%) and high-Mg calcite (HMC) (mean = 32%), with lesser amounts of low-Mg calcite (LMC) (mean = 14%) and dolomite (mean < 0.5%). Dolomite is present only within the silt fraction. Scanning electron microscope observations reveal the composition of the mud as primarily aragonite needles from green algal sources such as *Penicillus* and *Halimeda*, and from coral and mollusk shells (Fig. 7a). Aragonite chips from the bioerosion of coral by Clionid sponges are also apparent. HMC from the degradation of foram tests and perhaps from direct precipitation is abundant throughout (Fig. 7b). LMC is present in the form of coccoliths. Sands are primarily composed of benthic and planktonic forams, pelecypod, gastropod, echinoderm, coral, bryozoan, and *Halimeda* plate fragments, worm tubes, nondescript skeletal material, and carbonate lithoclasts.

Three lithologically distinct units were identified within the upper 240 cm of sediment recovered in cores. Deepest cores (208, 213, 220, 225) recovered a dark gray carbonate sandy mud with a mean grain size of approximately 10 microns at a subbottom depth of >160-200 cm. This muddy unit, hereafter referred to as Unit 1, is abruptly overlain by a much coarser unit (Unit 2). Unit 2 is marked by two to three very coarse



A.

B.

Figure 7. a) Scanning electron photomicrograph of sediment from core 226, 16 cm below the core top. Muds consist of a mixture of aragonite and high-Mg calcite and show little evidence of diagenesis. b) Scanning electron photomicrograph of sediment from core 226, 168 cm below core top. Muds are dominated by high-Mg calcite with some aragonite, and appear to be undergoing dissolution and micritization.

molluscan (pelecypod and gastropod) shell lags interbedded with finer sediment, and is generally 40 to 60 cm thick. Overlying Unit 2 is a unit of light gray carbonate sandy muds (Unit 3). Mean grain size in Unit 3 generally fines upward above a subbottom depth of approximately 120 cm (Fig. 8). Mean grain size at a subbottom depth of 100 cm averages 46 microns, whereas mean grain size at the sediment-water interface averages 17 microns. Surficial grain sizes are variable and patchy across the study area with finest sediments in the northwest near the Holocene reefs, and coarsest sediments generally in the center of the study area.

Geophysical-Geoacoustic Framework

Side-scan sonar data are still being processed. Preliminary processing reveals the extent and character of the hardbottom area and reef at the southern edge of the study area (dark areas in Fig. 9), minimal acoustic contrast within the sediment fill (white) over most of the study area, and the edge of the Holocene reef tract of the Dry Tortugas at the northern edge of the study area. Based on the increase in backscatter toward the south, sediments appear to coarsen towards the hardbottom area.

Seismic data reveal six seismic sequences in the subsurface bounded by five high-amplitude reflectors (α, β, γ, δ, ε) (Figs. 10 and 11). The hardbottom surface of the bathymetric high in the south is continuous in the subsurface as reflector ε. The antecedent high is also shown to be stratified with reflectors apparently truncated by a cut and fill channel structure to the south. Only two regionally semi-continuous subbottom reflectors are evident in the chirp data as a result of the higher frequency and greater attenuation of the sonar signal. The deepest reflector (Fig. 12) occurs at an average depth of approximately -30 meters (msl datum), is variable in amplitude and corresponds to reflector δ in the seismic data. Amplitude variability appears to vary inversely with the amplitude of the overlying reflector, ε. Reflector ε exhibits a continuous high amplitude return, and occurs at an average depth of -25 meters. Reflector ε crops out on the seafloor along the NE-SW

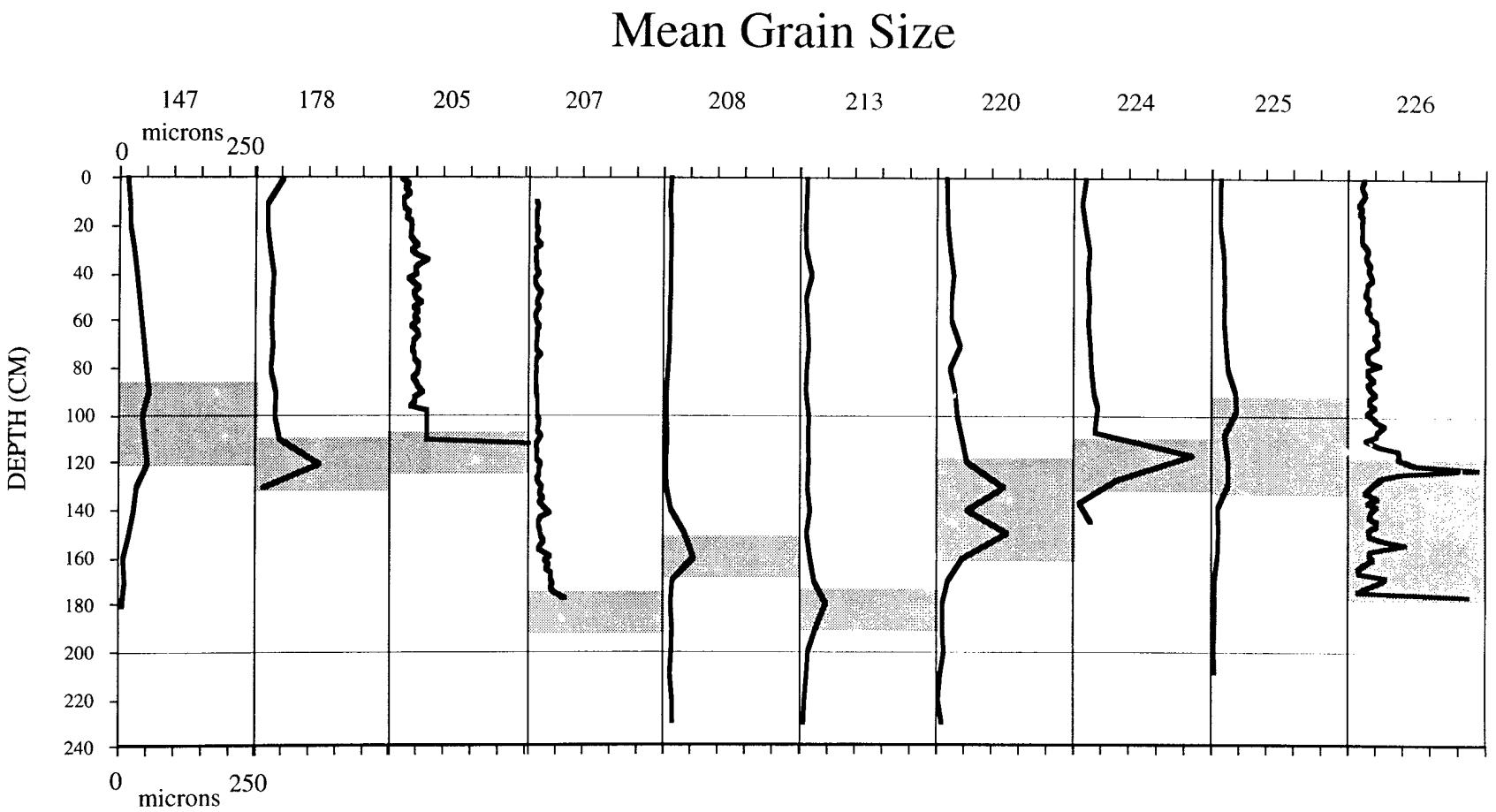


Figure 8. Plots of mean grain size versus depth of sediments from gravity cores shown in Figure 5c. Data were calculated using the graphic mean method of Folk (1980). Shaded areas correspond to the coarse shell beds of Unit 2. Note the fine-grain sediments of Unit 1, below Unit 2, indicating a low energy environment. Also note the general fining upward trrend of Unit 3, above Unit 2, indicating decreasing bottom energy and increasing mud supply during the late Holocene sea-level rise.

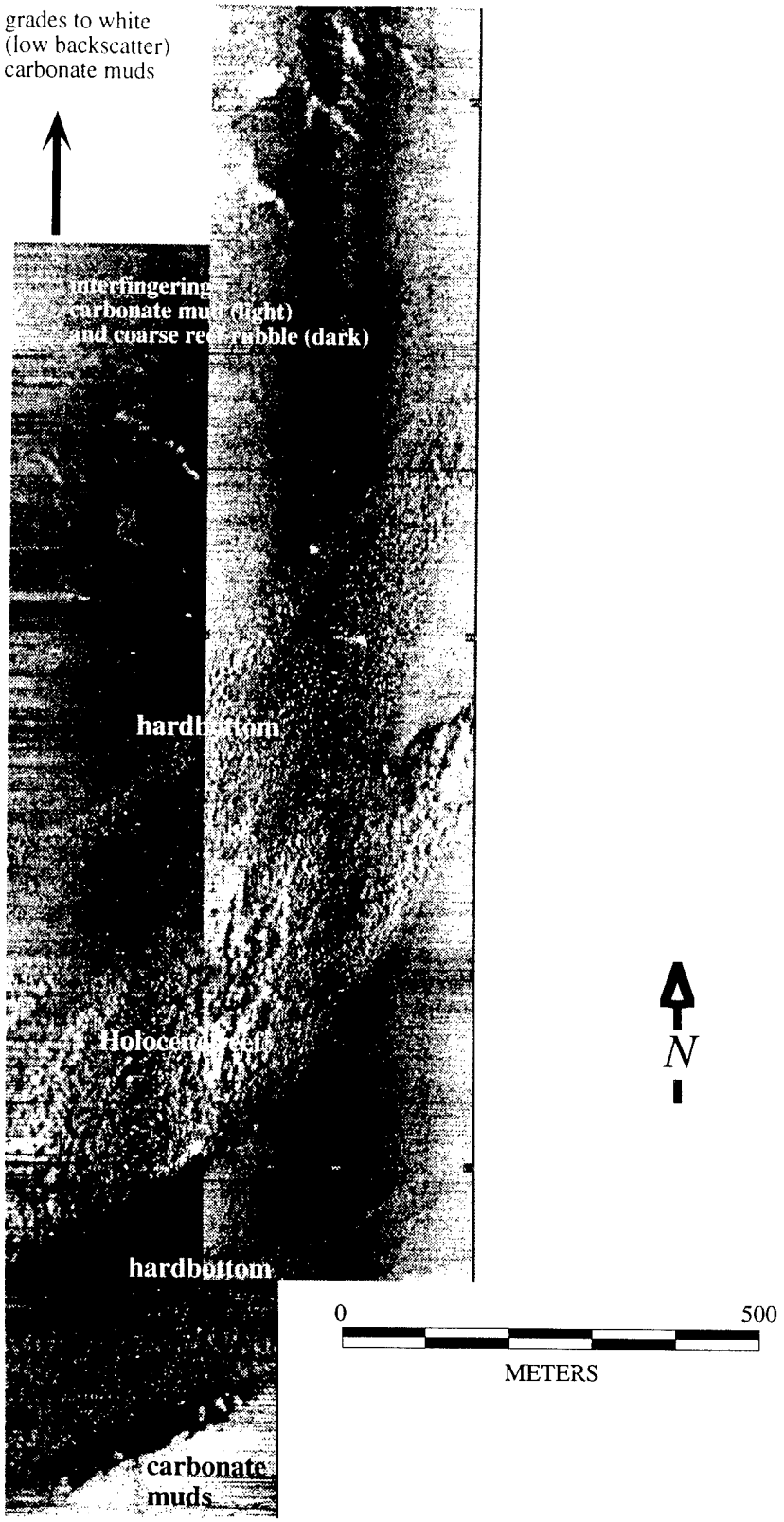


Figure 9. Side-scan sonar data from the Dry Tortugas area showing the high backscatter (dark) of the hardbottom with Holocene reef development in the southern study area.

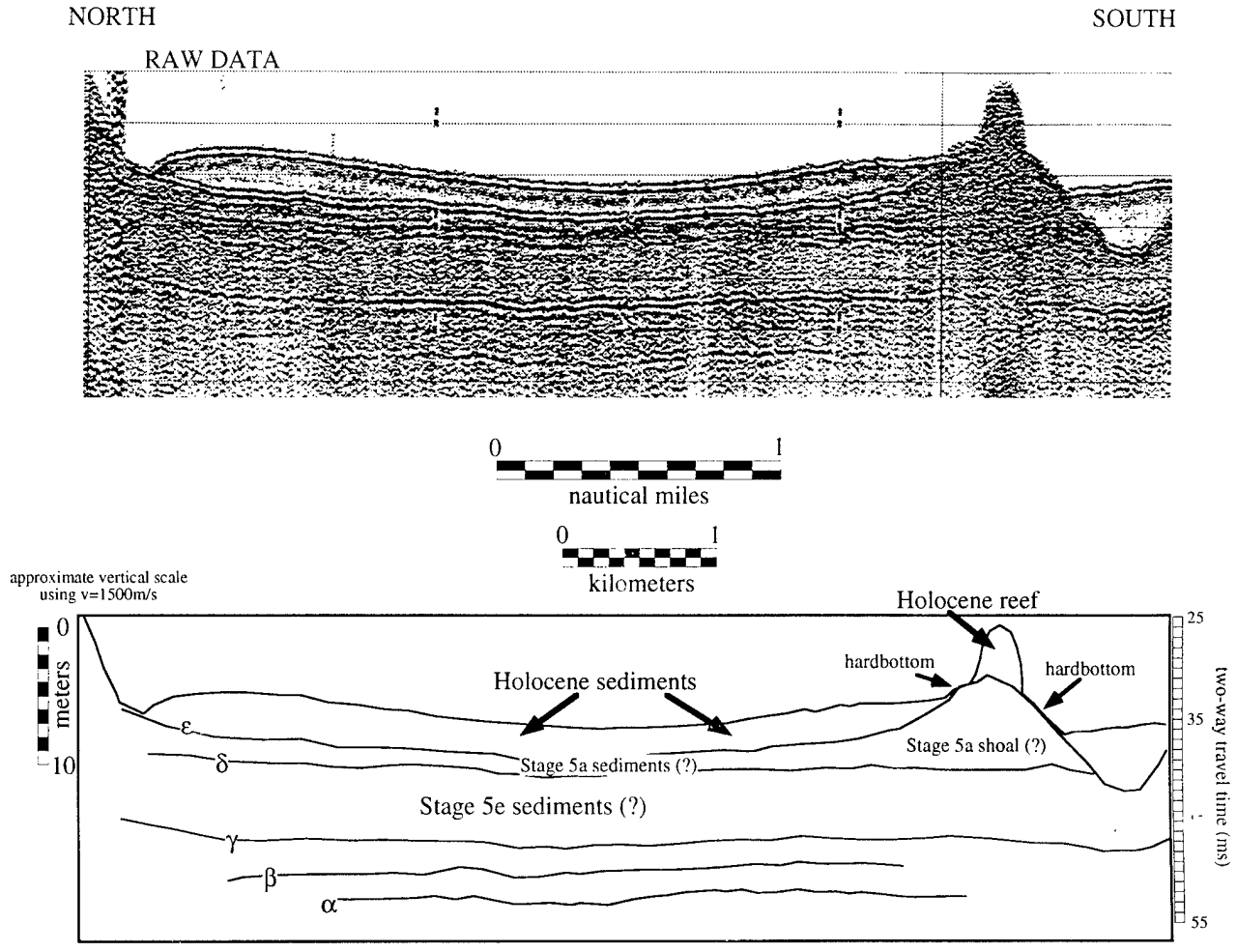


Figure 10. Seismic data and interpretation from the Dry Tortugas area showing reflectors α–ε, inferred sequence ages, and the shoal body with reef development in the south.

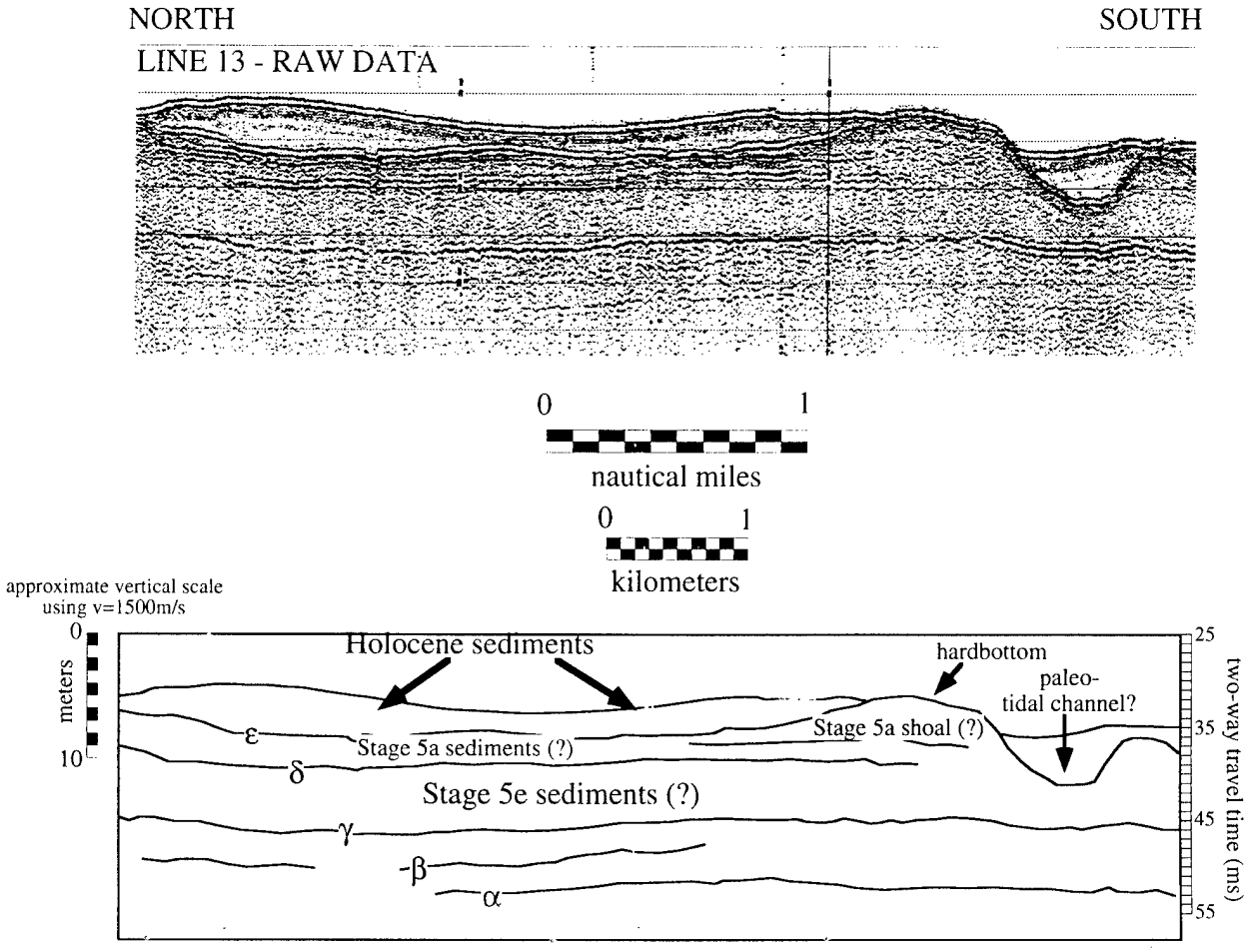


Figure 11. Seismic data and interpretation from the Dry Tortugas area showing reflectors α–ε, inferred sequence ages, and the stratified shoal body in the south.

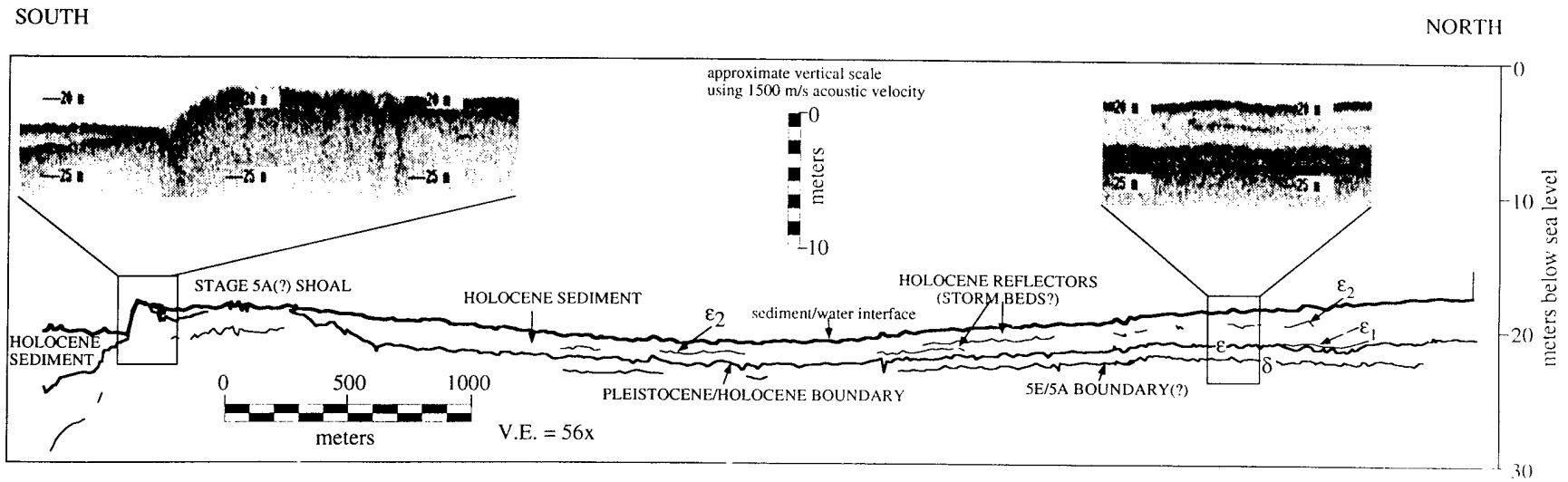


Figure 12. North to south cross-section of the study area based on interpreted chirp sonar data. See Figure 5a for location of cross-section. Chirp data sections corresponding to segments of the cross-section are shown. Reflectors are discussed in the text.

trending bathymetric high of the shoal. Where ε crops out, the reflection character changes to a highly diffracted, variable amplitude signal showing relief of tens of centimeters. The overlying unconsolidated carbonate sediments are largely acoustically transparent except for several very low amplitude, discontinuous, subparallel reflectors (Fig. 12). The lowermost of these reflectors, ε_1, occurs immediately superjacent to reflector ε in the northern portion of the study area where sediments are thickest. ε_1 occurs at a subbottom of approximately 2.5 meters. Another reflector, ε_2, occurs discontinuously throughout the study area at a subbottom depth of 1.5 meters.

The sediment water interface exhibits reflection coefficients ranging from -8 to -12 dB (r=0.40 to 0.25) (Fig. 13). Where hardbottom occurs, the reflection coefficient is variable as a result of bottom relief, but ranges from -2 dB (0.8) over a flat surface, to -24 dB (0.06) over a highly irregular surface.

Acoustic velocities of the sediment range from approximately 1480 to 1600 ms^{-1}, and tend to increase downcore (Fig. 14). Velocities below 100 cm are significantly more variable than velocities in the upper 100 cm. The high variability corresponds to coarse shell beds and heterogeneous sediments in the cores. Impedance values range from ~2.4 to 3.5 x 10^6 $kgm^{-2}s^{-1}$ (Fig. 15).

Discussion

No cores penetrated deep enough to recover any portion of sediment associated with reflectors α,β, γ, δ, ε or ε_1. However, certain inferences regarding their composition and origin can be derived from the acoustic signature of these reflectors. The variable but generally high amplitude of reflector δ indicates that this horizon is probably indurated on a local to regional scale. The discontinuous nature of this reflector can be partially attributed to acoustic attenuation of the high frequency chirp acoustic signal in the overlying sediments, and by the high impedance of reflector ε. Small scale relief of 1 meter is evident in reflector δ and is erosional in appearance. Reflector ε is interpreted as the transition

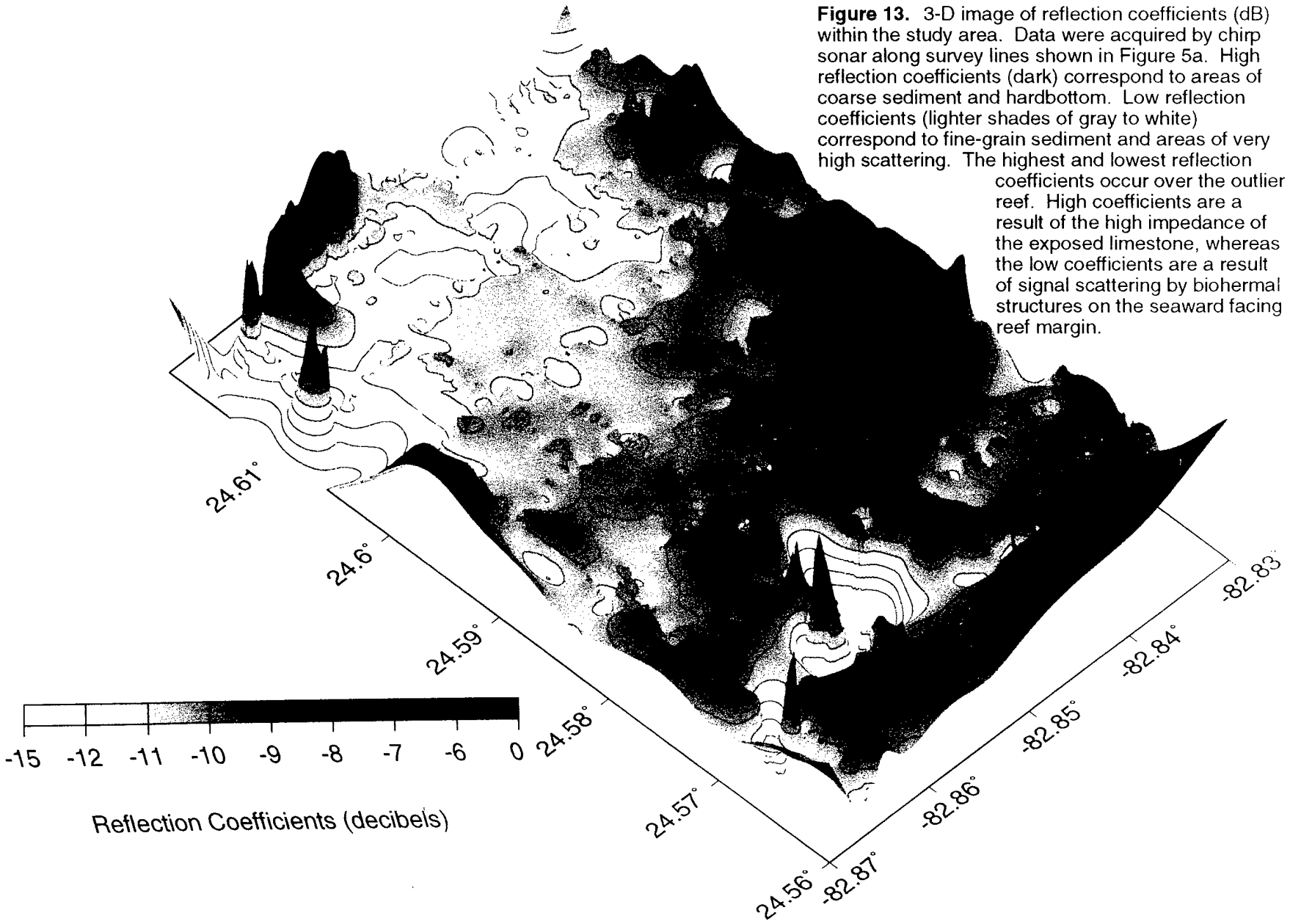


Figure 13. 3-D image of reflection coefficients (dB) within the study area. Data were acquired by chirp sonar along survey lines shown in Figure 5a. High reflection coefficients (dark) correspond to areas of coarse sediment and hardbottom. Low reflection coefficients (lighter shades of gray to white) correspond to fine-grain sediment and areas of very high scattering. The highest and lowest reflection coefficients occur over the outlier reef. High coefficients are a result of the high impedance of the exposed limestone, whereas the low coefficients are a result of signal scattering by biohermal structures on the seaward facing reef margin.

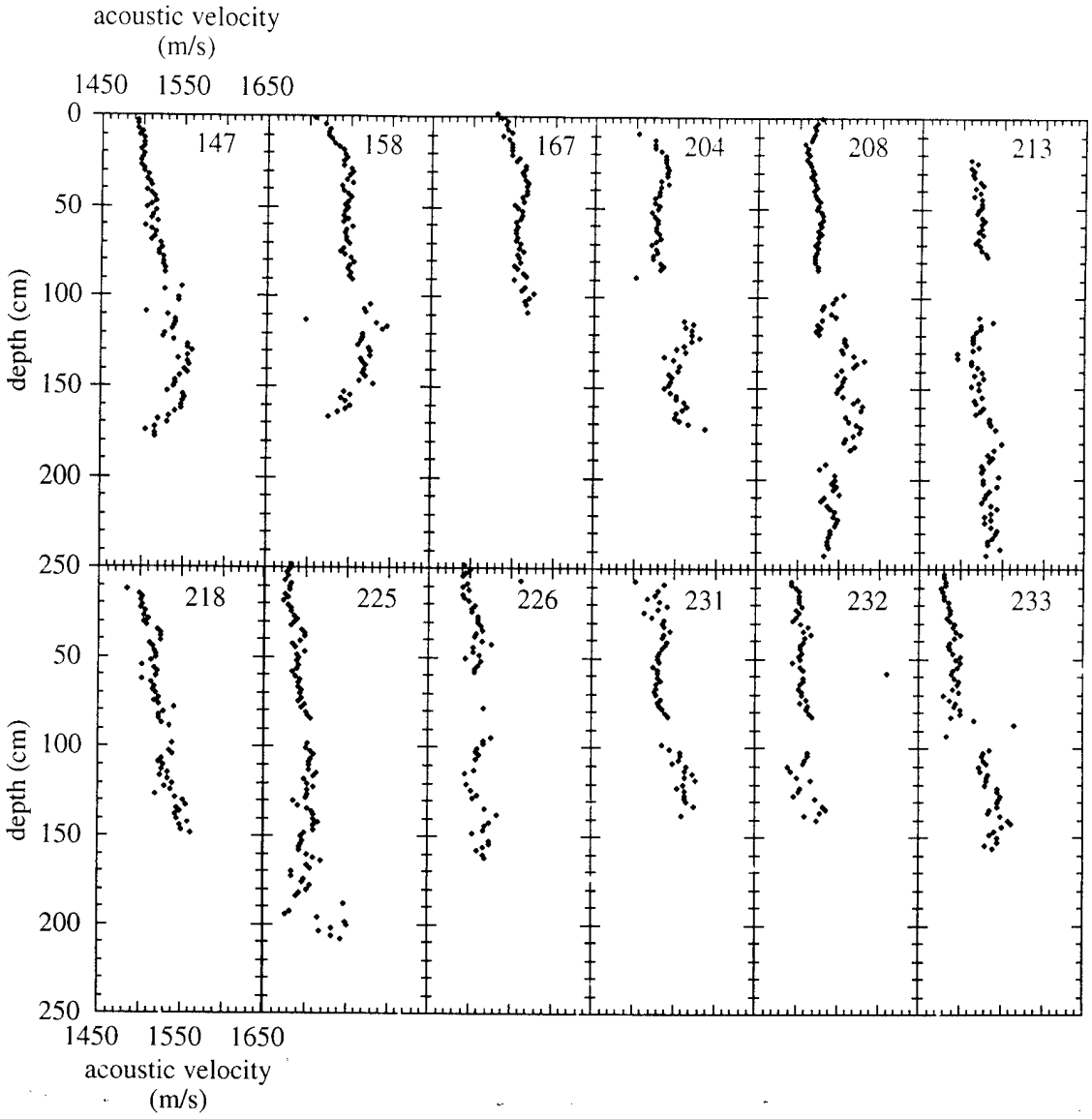
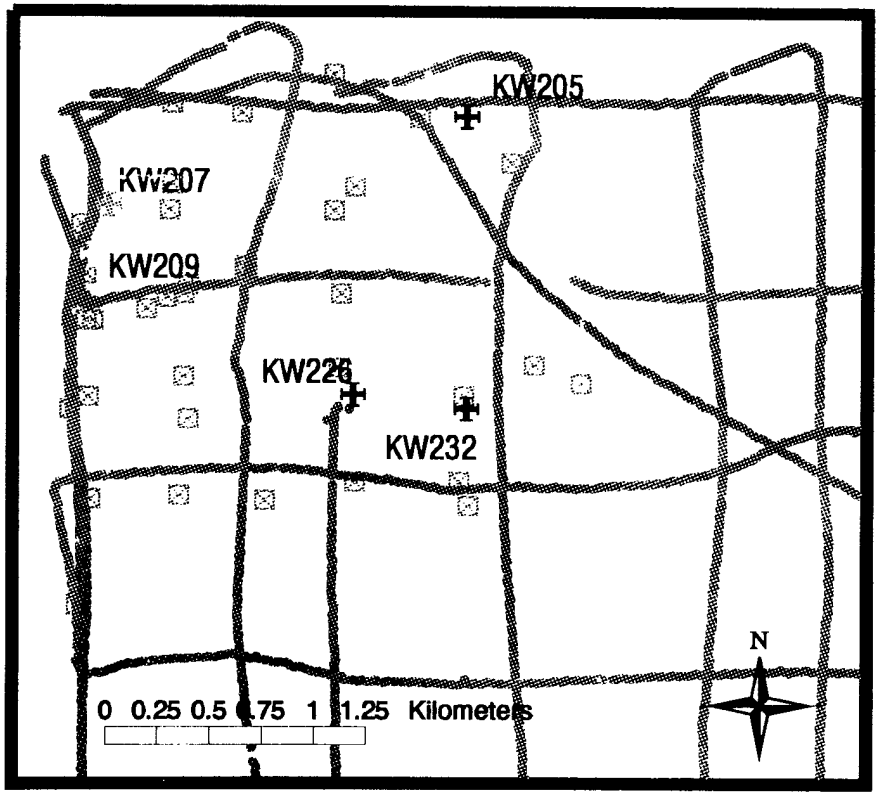


Figure 14. Plots showing downcore acoustic velocities measured by electric log on gravity cores shown in Figure 5c. Data gaps are a result of signal attenuation in very coarse sediments, or sediment disturbance where cores were sectioned.



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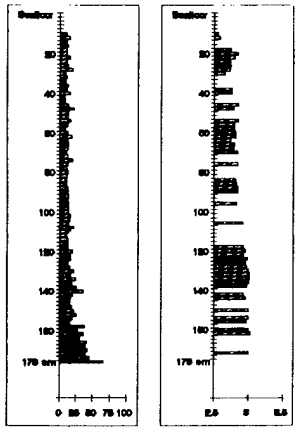

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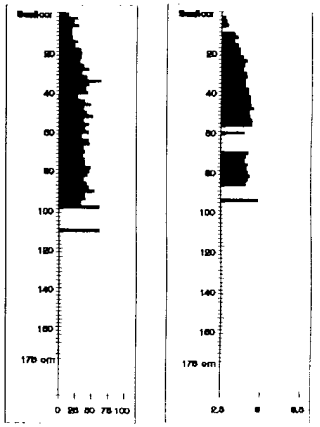

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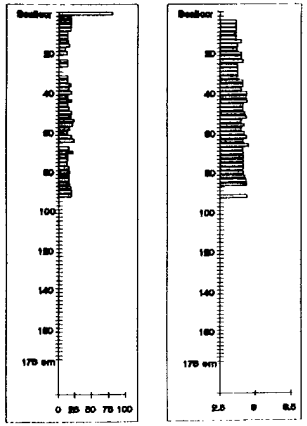

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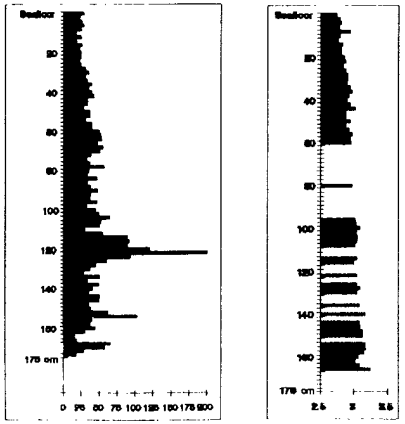

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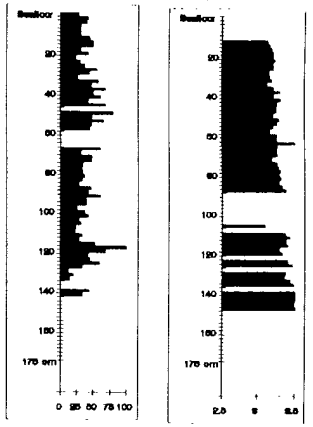


Figure 15.
Background shading reveals bathymetric variations along shiptrack. Grey and colored crosses correspond to core locations (unanalyzed and analyzed, respectively). Left charts show variations in mean grain size (in microns, horizontal axis) with depth below seafloor (in centimeters, vertical axis). Right charts show variations in impedance (in10^6 kg/m^2 s) with depth.

Bathymetry (meters)

- 0 - 7
- 7 - 9
- 9 - 11
- 11 - 13
- 13 - 17
- 17 - 18
- 18 - 19
- 19 - 20
- 20 - 22
- 22 - 61

between unconsolidated carbonate sediments above and variably indurated carbonate sediments below based on the strong impedance contrast. Several small sinkholes were encountered extending below ε, and propagating upward through ε_1 but not into the overlying sediments. Based on these data, ε is tentatively interpreted as a subaerial unconformity between Stage 5A carbonate sediments deposited in a shallow, tidal shoal setting, and Holocene sediments deposited in a forereef setting. This surface may be an extension of the paleosol surface present in the Marquesas and the Keys to the east (Shinn et al., 1990). Assuming that the shoal body identified in the southern portion of the study area is a Stage 5A tidal shoal, then reflector δ is likely the subaerial unconformity separating Stage 5A sediments from Stage 5E sediments.

The near transparency of the sediment unit overlying reflector ε indicates the absence of any subaerial exposure surfaces which would show significant cementation and high amplitude acoustic reflections. These data indicate that the entire unit above reflector ε is Holocene. The three units identified in cores are entirely within this Holocene sediment package. Unit 1 indicates a very low energy sheltered environment, such as a lagoon. Such an environment is expected during lower sea level as the shoal would block significant wave energy from the south and east and the antecedent high of the Key Largo Limestone would have blocked wave energy from the north and west. The superposition of reflector ε_1 on the subaerial unconformity (ε) indicates that ε_1 is a marine flooding surface, or perhaps preserved lagoonal muds which may grade upward into Unit 1 identified in the cores. The occurrence of this reflector only in the northwest corner of the study area on the rim of the bedrock high may indicate mud deposition associated with a mangrove fringe, a typical environment in the Keys today.

The abrupt upward transition to much coarser sediment in Unit 2 may reflect overtopping of the outer shoal during sea-level rise and introduction of higher wave energy into the depositional area. The imbricated coarse gastropod (Turritelid) and pelecypod shell beds and interbedded fining upward sediments associated with Unit 2 indicate high energy

conditions and are interpreted as storm deposits, possibly associated with hurricanes. Shinn et al. (1990) identified similar shell beds in vibracores from the Quicksands (60 km to the east), and also interpreted them as storm beds. Reflector ε_2, within the unconsolidated Holocene sediment unit, occurs at depths corresponding to the coarse shell beds seen in the cores. This horizon represents much higher energies of deposition than sediments above or below and may be viewed as a flooding surface when the outlier reef was submerged by rising sea level.

The fining upward trend in Unit 3 reflects decreasing ambient bottom energies associated with normal wave activity during sea-level rise since the early Holocene, and a change in sediment source. Much of the fining upward trend likely results from the contribution of carbonate mud from new sources as extensive Holocene reef growth began on the antecedent highs, and backreef areas were flooded allowing mud producers, such as *Halimeda* and *Penicillus*, to become more prolific.

A diagenetic profile is apparent based on microscopic analyses. SEM observations of samples from the top 20 cm of cores show little evidence of dissolution, micritization, or cementation of carbonate muds (Fig. 7a). Samples from near the base of cores show significant evidence of micritization and cementation (Fig. 7b). Aragonite overgrowths were noted on larger carbonate fragments. The diagenetic profile is most apparent in observations of coccoliths. Coccolith preservation ranges from pristine near the sediment/water interface to highly degraded in the base of cores. Diagenesis of these grains is driven by their metastability and is accelerated by aerobic and anaerobic microbial decomposition of organic matter. Sulfate reduction in the presence of carbonate sediments can produce dolomite (Baker and Burns, 1985; Compton, 1988). However, it is not clear whether dolomite found in this investigation is the product of *in situ* diagenesis, or reworked from an external source. No dolomite rhombs were observed by SEM.

It is evident that much of the mud is not produced *in situ* but is derived from the surrounding carbonate banks. Muds are exported from the carbonate banks by wave and

tidal current activity and deposited in the study area, with thickest deposits near the source areas. During dive operations, no significant carbonate mud producers were noted in the study area. The increase in mean grain size toward the south and east reflects a combination of increased bottom energy toward the Florida Straits, the direction of greatest fetch and wave energy, and proximity to source with most of the mud being derived from the reefs and backreef areas of the Dry Tortugas.

Reflection coefficient values appear to correspond to the mean grain size of the surface sediment as determined on core samples in the laboratory. The chirp data indicate a bottom sediment mean grain size primarily in the coarse silt size fraction. Chirp data suggest variations in the seafloor sediment grain size across the study area. The seafloor reflection coefficient in the area of core KW-205 is approximately -10 to -11 dB (0.31 to 0.28) indicating a coarse silt grain size. Grain size analyses of KW-205 indicate an average mean grain size of 15 microns (medium silt) in the top 10 cm. The seafloor reflection coefficient in the area of core KW-226, south of KW-205, is higher (-9 to -10 dB; 0.35 to 0.31) indicating coarser sediment. Surface mean grain size at KW-226 is 28.6 microns (coarse silt). Progressing south the seafloor reflection coefficient increases to -8 dB (0.40) indicating coarser sediment. Hardbottom areas are easily mapped based on a very high reflection coefficient of -2 to -4 dB. The very low reflection coefficients (-20 dB) on the seaward side of the outer reef are the product of high scattering resulting from biohermal structures at least 1 meter in relief.

Although impedance estimates have not yet been derived for subbottom reflectors in the chirp data, attempts were made to produce stickograms of impedance contrasts using the product of density and velocity as measured on cores. The primary difficulty with this modeling approach is acquiring useful velocity data for coarse sediment intervals within the cores. Where very coarse shell material is present, attenuation of the acoustic signal used to measure velocity is great. As a result, the first arrival of the acoustic wave may not be detected and an erroneous (lower) velocity is measured. Unfortunately it is these intervals,

where the impedance contrasts should occur, which are of greatest importance to modeling. Nevertheless, where adequate data are available, forward modeling reveals some agreement between sediment physical properties, acoustic properties measured by the electric logger, and the chirp sonar data (Fig. 16).

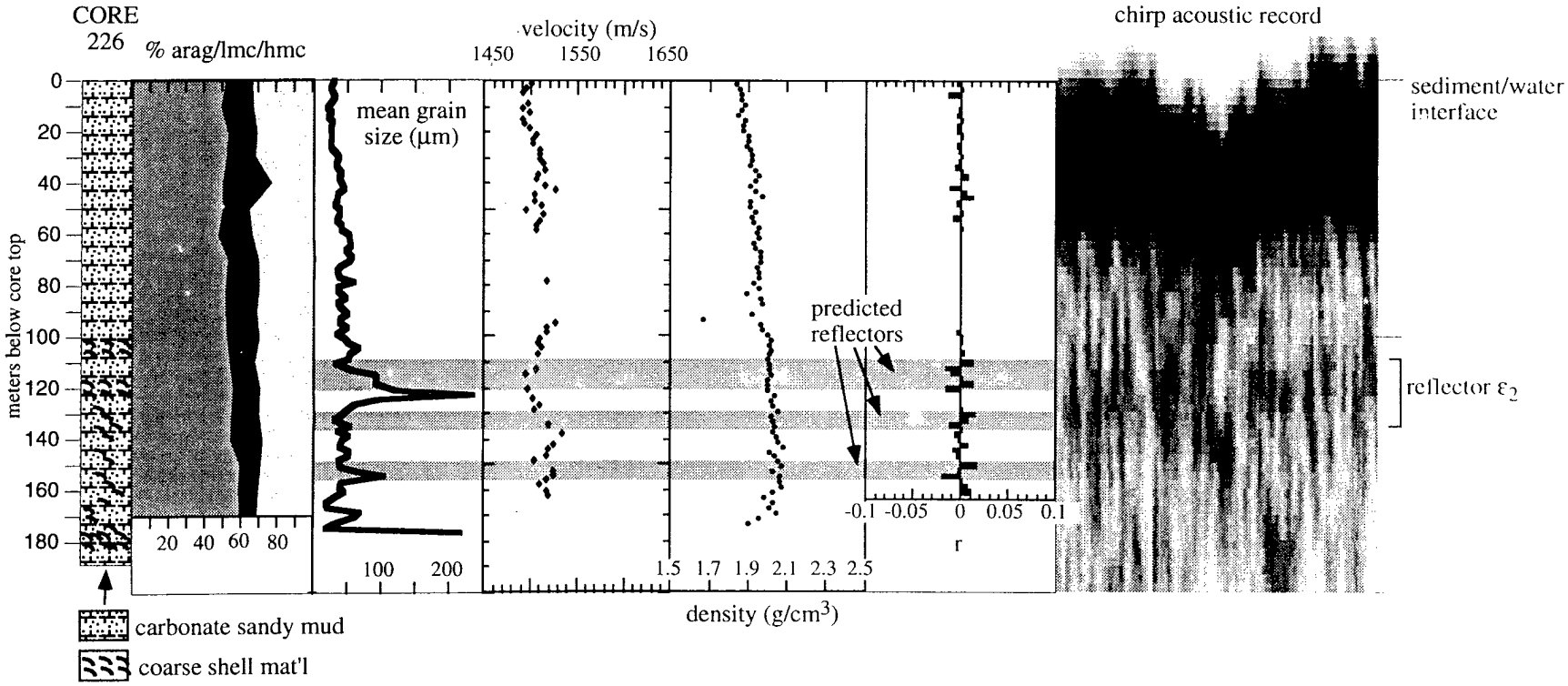


Figure 16. Diagram relating the physical and acoustic properties of sediment from gravity core 226 to the chirp sonar data in the same area. The shell beds of Unit 2 produce variability in the velocity and density structure which produce impedance contrasts. The stickogram of reflection coefficients $\{r = (\rho v_2 - \rho v_1) / (\rho v_2 + \rho v_1)\}$ was produced by averaging impedance (ρv) over 4 centimeter intervals. The depth of the shell beds and modeled impedance contrasts coincides well with the position of reflector ε_2 in the chirp data.

SECTION II. BOCA RATON STUDY AREA

Geologic Framework

The Boca Raton study area (Fig. 17) is a wave-dominated high energy coastline containing mixed carbonate-siliciclastic sands, and fronted by a degradational reef. The side-scan sonar mosaic (Fig. 18) reveals the extent and character of the erosional reef-tract, the sediment fill within the back-reef trough, and the outcropping limestone near the upper shoreface. Carbonate sediments are being shed from erosion of the reef-tract and create bedforms or sand patches migrating southward within the back-reef trough. These carbonate sand patches show greater acoustic backscatter (darker in Fig. 18) than the surrounding siliciclastic-rich sediments. Based on diver observations, the acoustic variability between sediment types is a function of texture and mineralogy as opposed to seafloor relief.

Interpreted vertical beam chirp sonar data are presented in Figures 19 and 20. Maps of the geologic framework based on the chirp data have been produced at USF and are presented in Figures 21, 22 and 23. These include bathymetry, sediment isopach (thickness), and a structure contour map of the surface of the limestone basement. Bathymetric data within the study area reveal a moderately steep upper shoreface environment between 0 and 18 meters below mean sea level (bmsl), a broad middle shoreface terrace between 18 and 22 meters, and a steeply dipping lower shoreface / inner continental shelf environment from 22 to >70 meters. Greatest sediment thickness (4 to 8 meters) occurs across the middle shoreface terrace, and at the seaward edge of the study area at waters depths of > 55 meters. The structure contour map of the limestone surface reveals a continuous broad terrace, a drowned Holocene reef at 24 to 30 meters below mean sea level (Lighty, 1985), with smaller local depressions and highs. The limestone crops out in the upper shoreface and along the relic reef tract offshore.

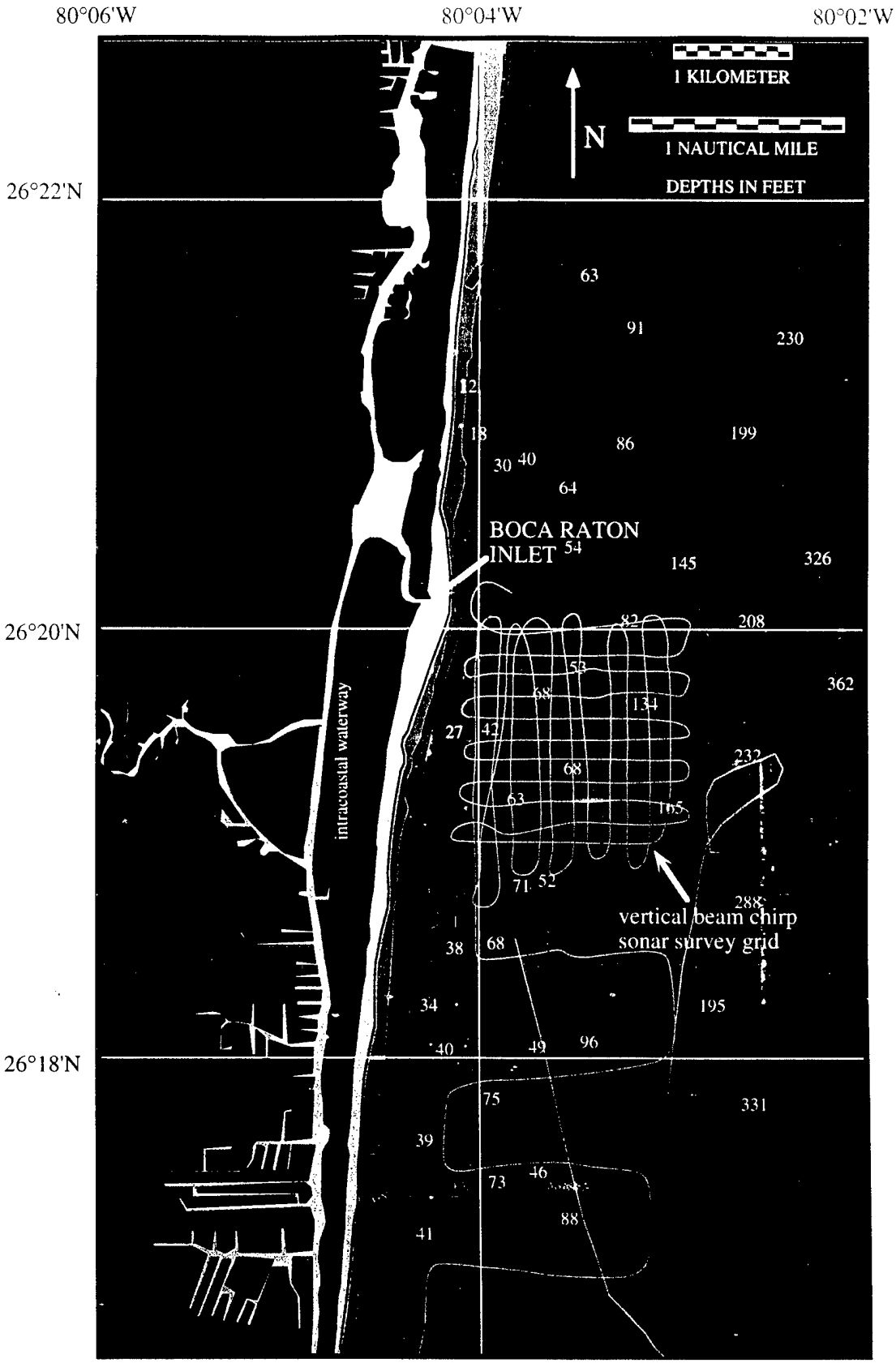


Figure 17. Chart of the Boca Raton study area showing cruise tracks where vertical beam chirp sonar data were collected. Soundings are in feet.

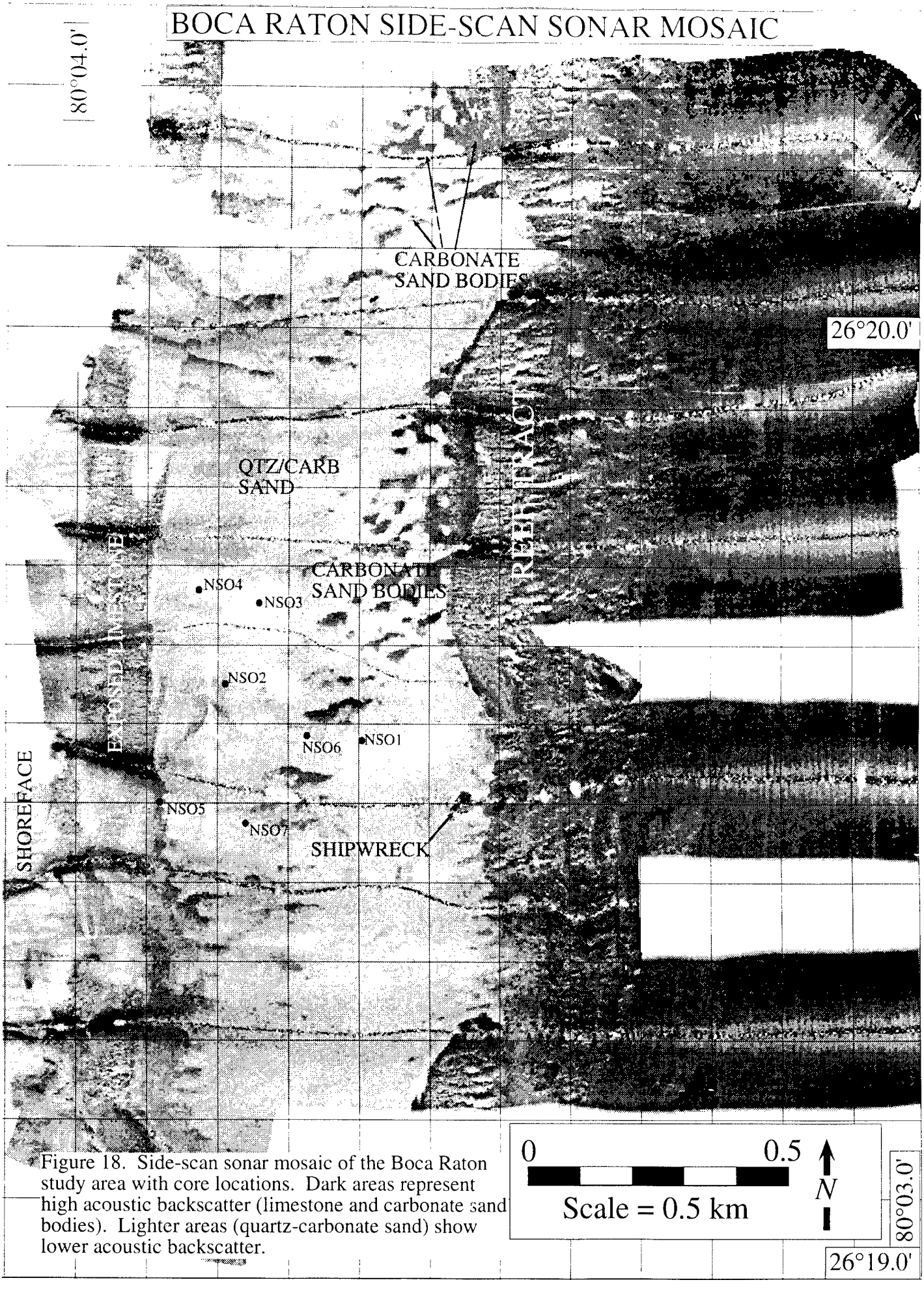


Figure 18. Side-scan sonar mosaic of the Boca Raton study area with core locations. Dark areas represent high acoustic backscatter (limestone and carbonate sand bodies). Lighter areas (quartz-carbonate sand) show lower acoustic backscatter.

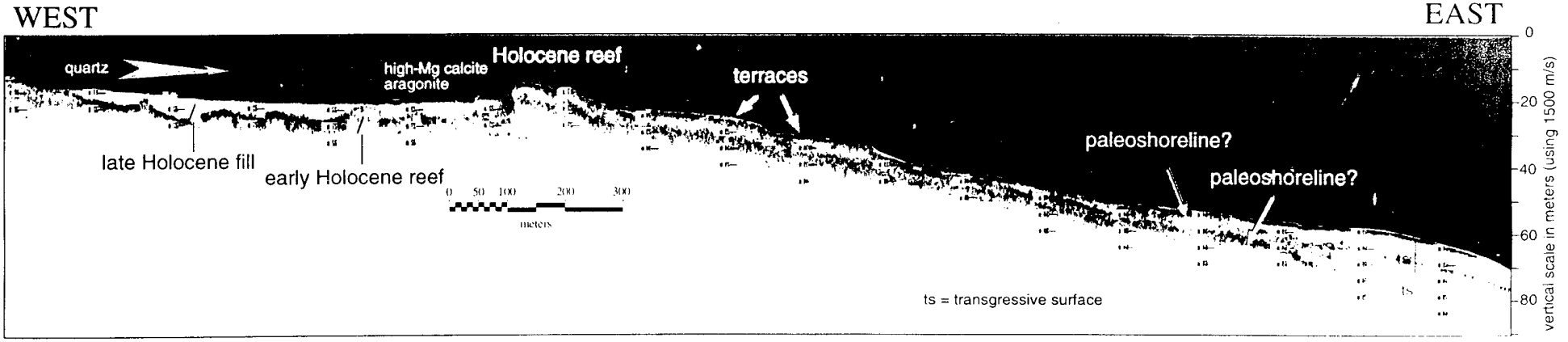
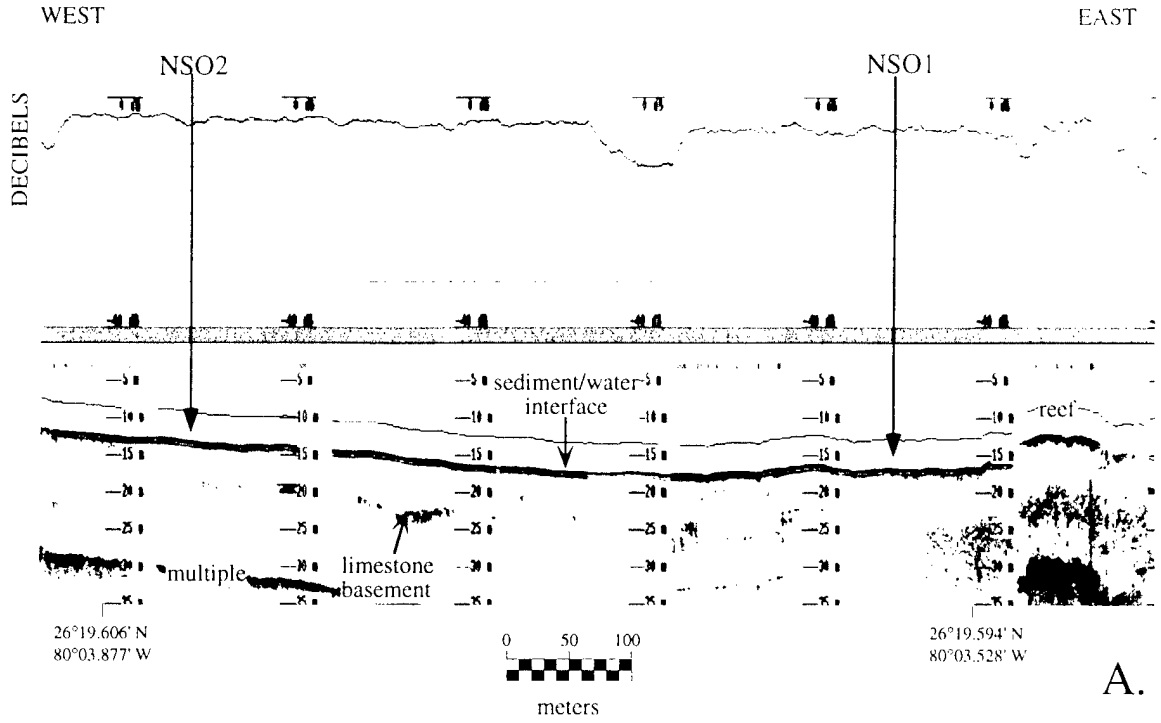


Figure 19. Chirp sonar data from the Boca Raton area with interpretations.



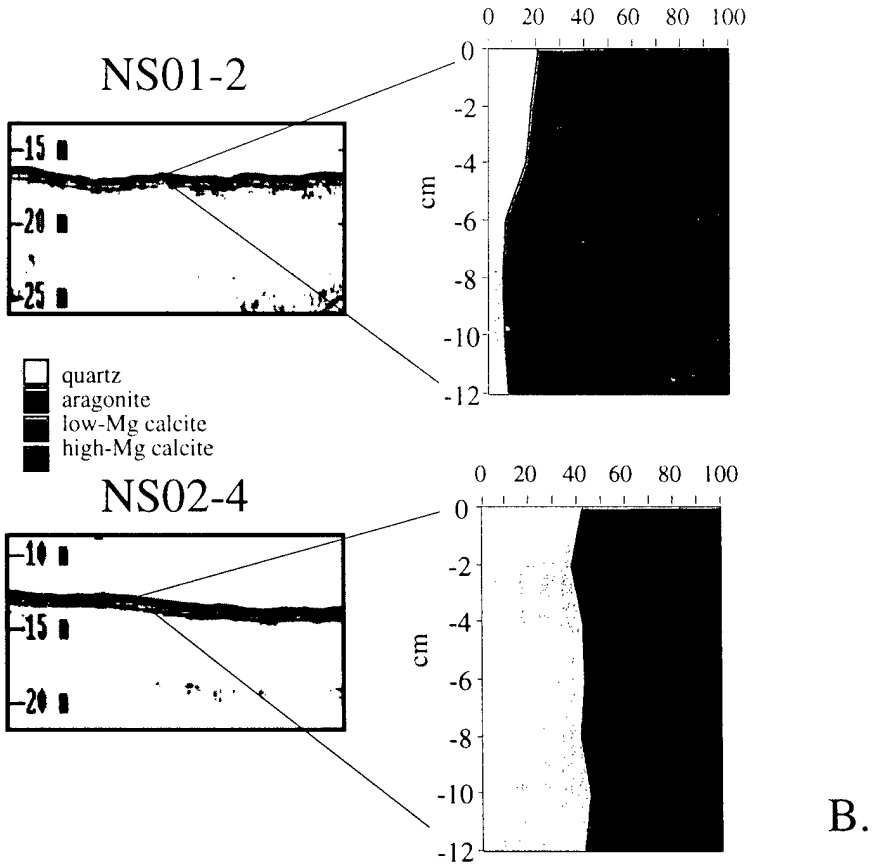


Figure 20. a) Vertical beam chirp sonar data from the Boca Raton study area showing the location of ground truth data provided by ISSAMS and DIAS probes and sediment cores. b) Chirp sonar data and mineralogy of sites NSO1-2 and NSO2-4 illustrating the acoustic facies change related to mineralogy.

Bathymetry

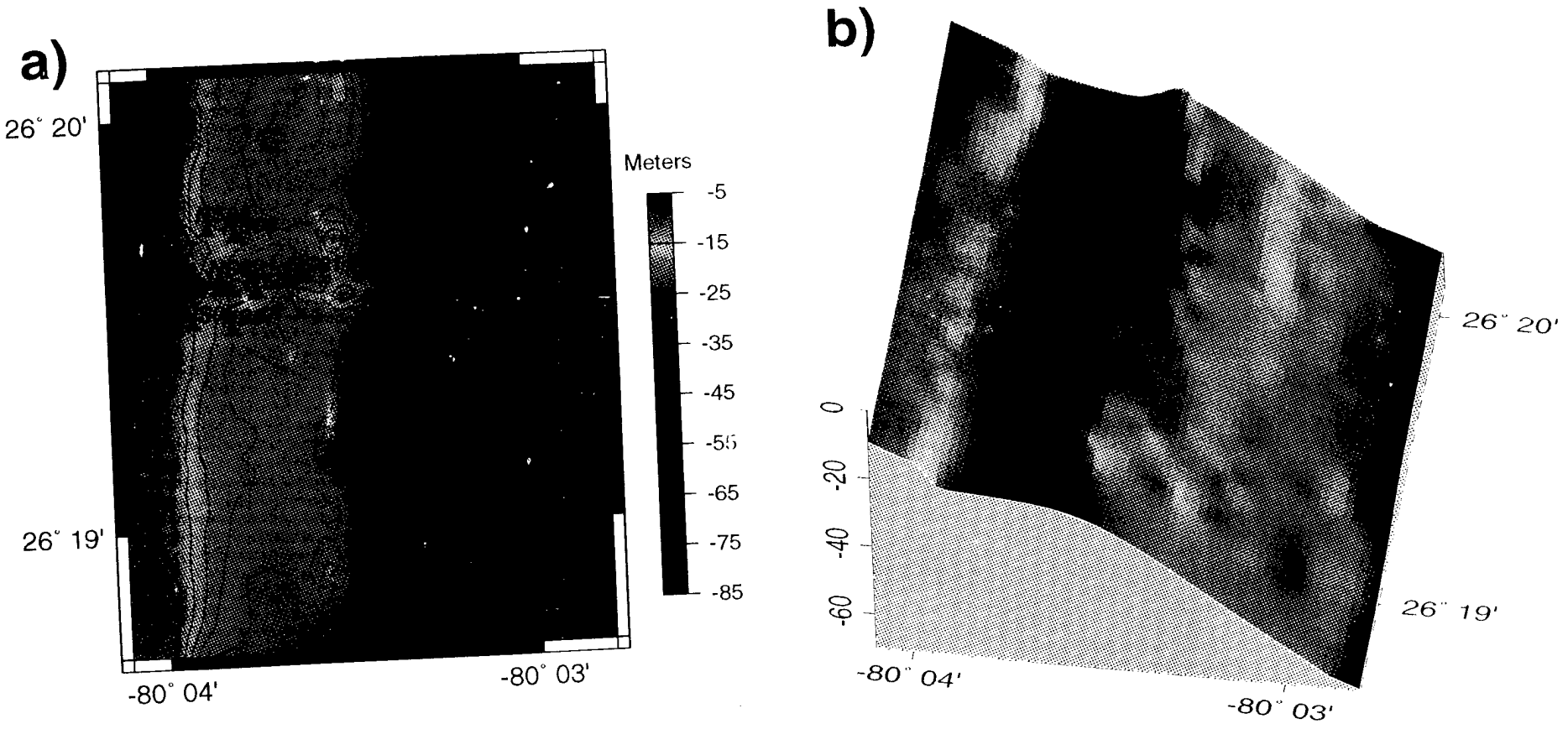


Figure 21. Bathymetry derived from CHIRP sonar data shown (a) in map view and (b) from a perspective of N170E, 45°.

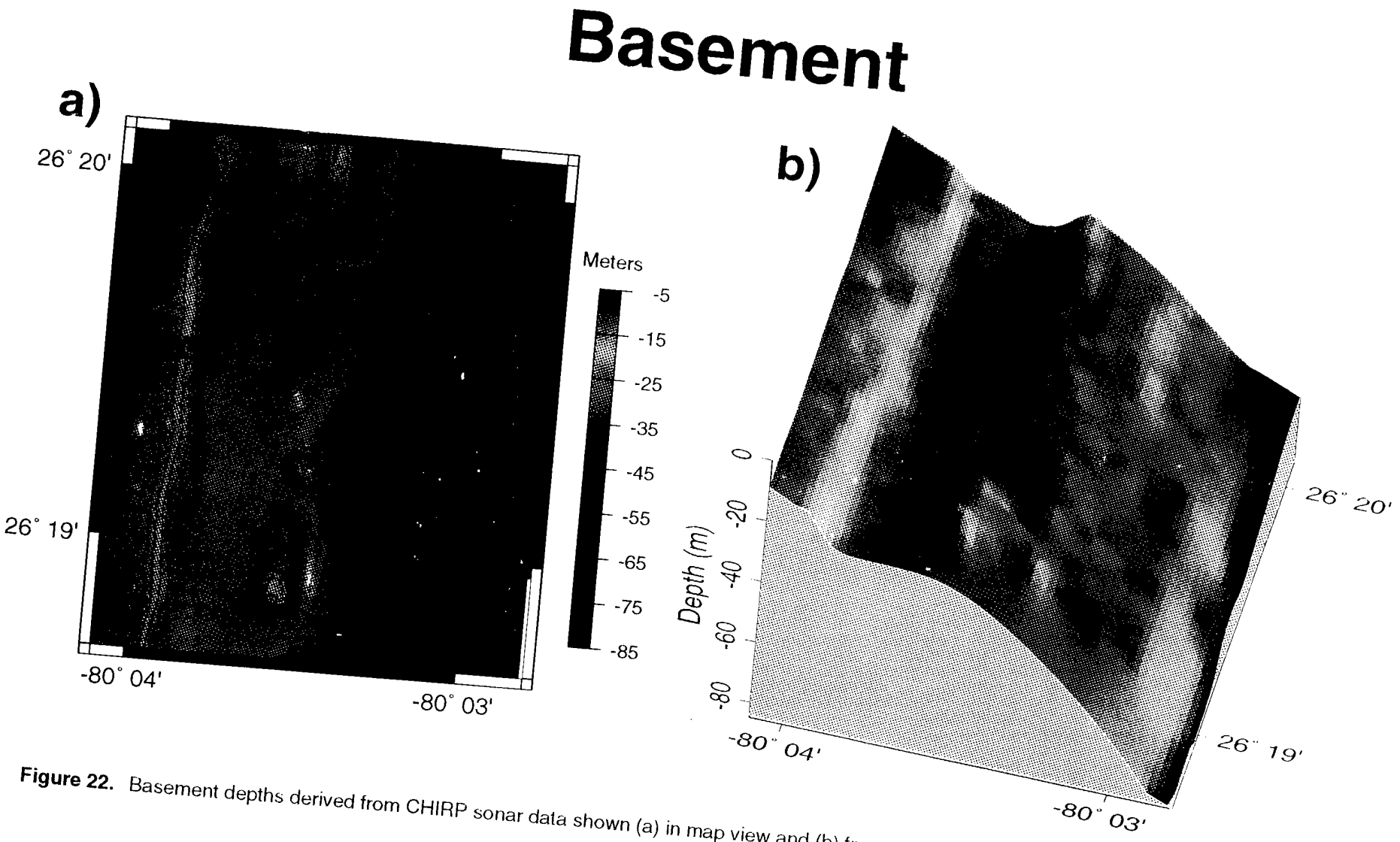


Figure 22. Basement depths derived from CHIRP sonar data shown (a) in map view and (b) from a perspective of N170E, 45°.

Isopach map

Figure 23. Map view of isopach data derived from CHIRP sonar data.

Mineralogic-Petrologic Framework

Sediments within the study area are mixed siliciclastic-carbonate sands (Fig. 24). Mean grain size averages approximately 2 phi (Table 2). The mud content is very low, ranging from 0.8 wt.% to 1.9 wt.%. Carbonates are generally dominated by aragonite with lesser amounts of low-Mg calcite and high-Mg calcite (Figs. 24 and 25; Appendix A). No dolomite was encountered in these cores. Sediments from sites NSO2, NSO3, NSO4, NSO5, and NSO7 are similar in that they have significant quartz (>35%), and little high-Mg calcite (<20%). Core sites NSO1 and NSO6 are closest to the reef tract and in the path of carbonate sands eroded from the reef (Fig. 24). NSO1 and NSO6 both have greater high-Mg calcite contents (>30 wt.%). Core NSO1-2 was taken in one of the carbonate patches seen on the side scan sonar mosaic less than 10m from NSO1-4. NSO1-2 is unique in that the quartz content decreases downcore from 20.6% to 6.2% and high-Mg calcite comprises 50-70% of the sediment.

Geophysical-Geoacoustic Characteristics

Chirp data are shown in Figure 19 and 20. One major subsurface reflector is evident in the chirp data. Based on the high amplitude of this reflector and karst-like relief on this surface, this horizon is probably a subaerial unconformity and marine flooding surface developed during the last interglacial lowstand and subsequent Holocene sea-level rise. Sediments overlying this reflector show no internal stratification, however, there is an acoustic facies change in a shore-normal direction. Nearshore sediments are acoustically transparent and provide an initial high amplitude, narrow-band acoustic return. The sediments further offshore, toward the reef, exhibit an acoustic response with greater attenuation over the sediment column which tends to degrade the image of the deeper reflector.

Velocity, density, and impedance data from diver cores are presented in Figure 26 and Appendix A. NSO1-2, the core with the lowest insoluble residue, has the lowest

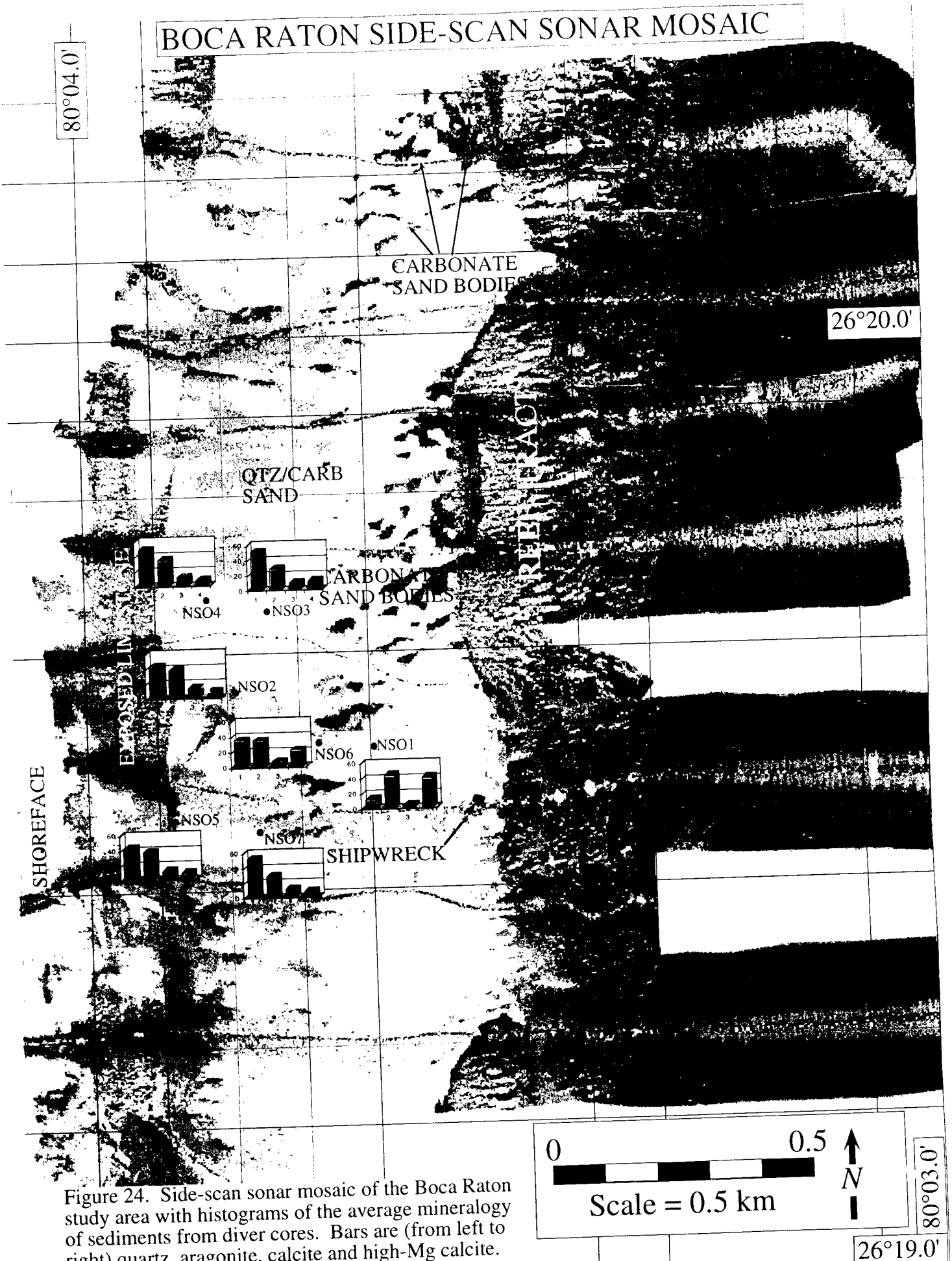


Figure 24. Side-scan sonar mosaic of the Boca Raton study area with histograms of the average mineralogy of sediments from diver cores. Bars are (from left to right) quartz, aragonite, calcite and high-Mg calcite.

Mineralogy of Cores

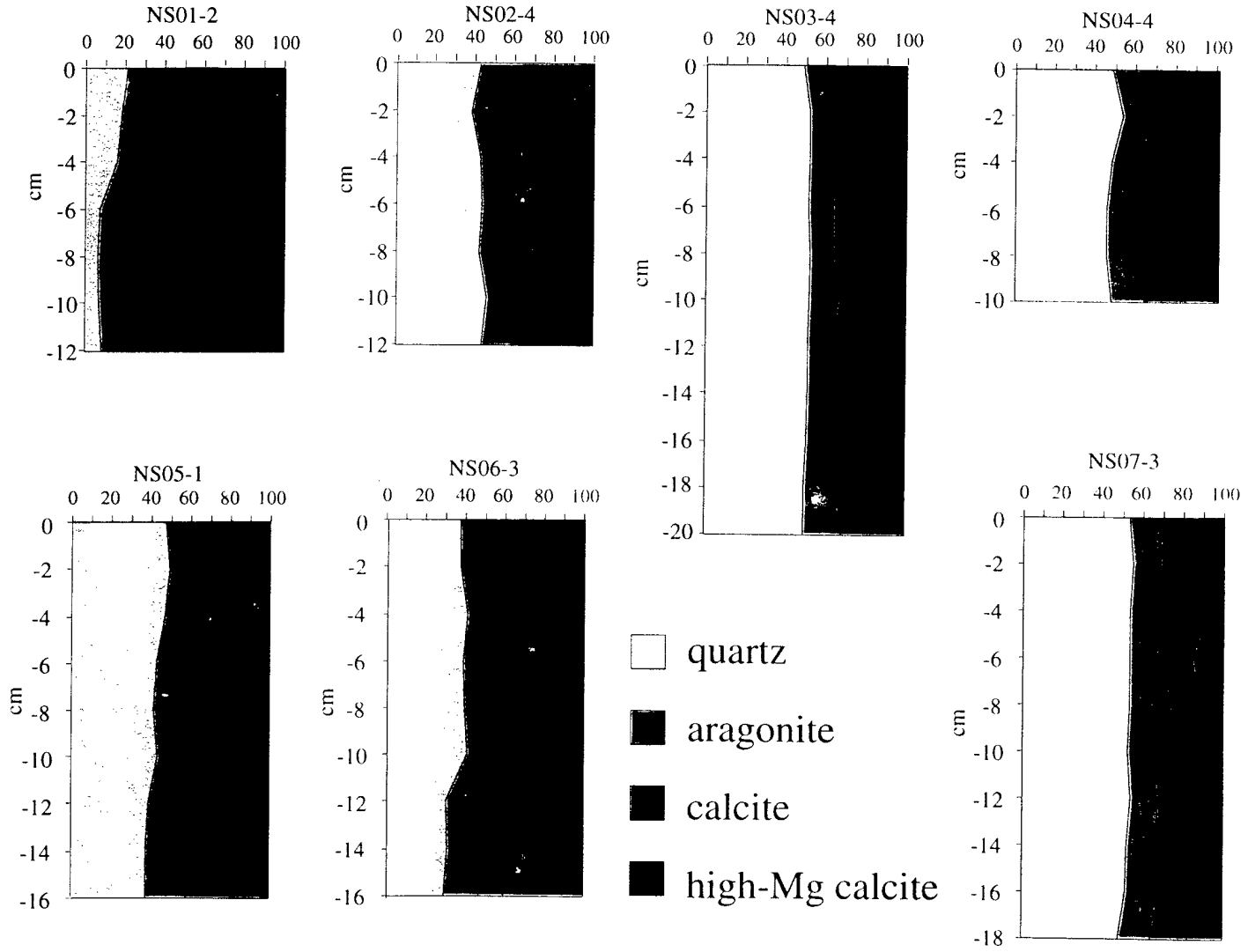


Figure 25. Mineralogy of sediments from diver cores taken in the Boca Raton study area. Carbonate mineralogy is determined by x-ray diffraction using standards. Quartz abundance is determined by acid-insoluble residue analyses.

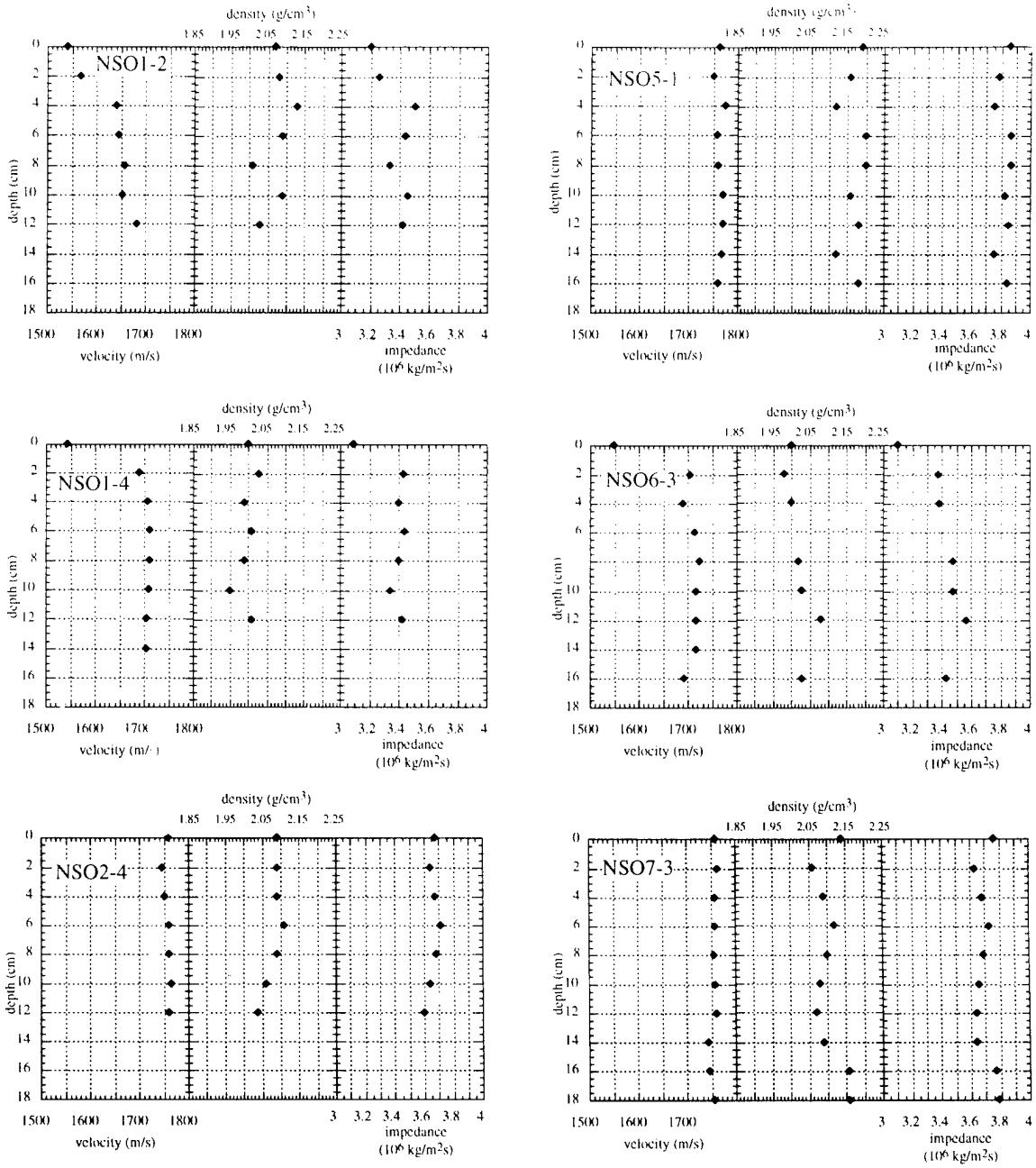


Figure 26. Graphs of p-wave velocity, wet bulk density and impedance versus depth in diver cores from the Boca Raton study area.

velocity (top 10 cm ave.= 1633 ms^{-1}). Cores NSO1-4 and NSO6-3, which have greater amounts of high-Mg calcite, have velocities averaging 1706 and 1709 ms^{-1}, respectively, in the top 10 centimeters. The remaining cores have velocities averaging approximately 1760 ms^{-1} over the same depth interval. Wet density varies from approximately 2.0 to 2.2 gcm^{-3}.

Discussion

The Boca Raton study area is a windward reef margin. This area has been investigated by Lighty (1985) who revealed that reef growth occurred during lower sea-level conditions of the early Holocene. The coral facies are similar to other Caribbean coral reefs and consist of forereef head corals (*Montastrea, Diploria*), reef framework branching corals (*Acropora palmata*), backreef branching corals (*Acropora cervicornis*), and backreef head corals. Lighty (1985) obtained radiocarbon dates of skeletal aragonite and submarine high-Mg calcite. The oldest date is 9,440 ± 85 years BP and the youngest is 7,145 ± 80 years BP. A mean aggradational rate of 6.6 m/1000 years was determined. The reef began as a fringing reef then developed into a barrier reef as sea level rise flooded the backreef area. Rapid sea-level rise and flooding of the backreef lagoonal area resulted in reef degradation by inimical waters at about 7000 years BP. Temperature and salinity fluctuations and higher turbidity in the nearshore waters stressed the reefs and terminated reef-framework aggradation.

The sediments sampled by divers in the backreef low (no longer a lagoon) are skeletal carbonates and quartz sand with minimal mud. The coarse nature of the sediments results from a combination of the high energy, wave-dominated environment, a lack of carbonate mud producers, and the lack of a terrigenous mud source. Carbonate skeletal material is dominated by pelecypod shells that display a wide range of preservation, from articulated and minimally abraded, to severely abraded, fragmented, and fossilized (gray). Much of the carbonate material is apparently produced within the local depositional area.

The quartz sand is transported in the littoral zone from the north via longshore currents. Some may also be reworked from Plio-Pleistocene beach and dune ridges on land.

The side-scan sonar mosaic reveals the presence of coarse patches of carbonate material being eroded from reefal highs. These patches are elongate and trend ENE-WSW. They appear to be sandwaves with a wavelength of approximately 75 to 100 meters, however, diver observation and chirp sonar data show negligible relief. The occurrence of the carbonate patches is obvious based on backscatter contrast with the carbonate sediments showing higher backscatter (darker hue) than the finer, quartz-rich sediments (lighter hue). The carbonate patches maintain their integrity as they migrate shoreward and downcurrent (southward), indicating that they are acting as coherent sandwaves.

Density and velocity measurements of core material show little variation in density (range = 1.95 to 2.2 gcm^{-3}) and high velocities (1540 to 1775 ms^{-1}), resulting in high impedance values (>3.2 x 10^6 $kgm^{-2}s^{-1}$). Impedance increases toward the reef, perhaps in response to increased grain size of the carbonate dominated sediments.

SECTION III. INDIAN ROCKS BEACH

Geologic Framework

The Indian Rocks Beach study area is a shallow (<6 meters), low-gradient, wave-dominated, low to medium energy, mixed carbonate and siliciclastic nearshore environment. Approximately 370 km of side scan sonar tracklines comprising a mosaic of roughly 100 km^2 have been acquired within the study area (Fig. 27), and present a unique, high-resolution image of the seafloor (Fig. 28). Swath-beam bathymetry using an ELACS system was also acquired over a smaller area within the confines of the side scan mosaic (Figs. 29-32). Approximately 225 km of chirp sonar data were acquired within the Indian Rocks Beach area. Track lines are oriented north-south and east-west and are spaced at 100 meter intervals (Fig. 33). Total coverage is approximately 9 km^2. High resolution, single channel, digital seismic data (370 km) are also available from this study area (Fig. 34). Ground truth data consist of 24 vibracores and grab samples. Three sites were evaluated using the ISSAMS, and nine diver cores were taken.

Within the study area large sand ridges overly intermittently exposed limestone hardbottoms. Sand ridges are approximately 1 to 2 meters in relief and trend NNW-SSE, oblique to the coastline and subparallel to each other (Fig. 35). Ridges occur from the lower shoreface to at least 25 km offshore, and increase in wavelength and thickness (to as much as 4 meters) in an offshore direction. Harrison (1996) found a hierarchy of bedforms which are superimposed upon the sand ridges suggesting that the ridges, or at least the surface of the ridges, periodically equilibrate with the modern hydraulic regime. Some of the ridges appear symmetrical whereas others appear asymmetrical and suggest a southerly current flow. The ridges in the northwest portion of the study area are comprised of smaller sand waves. The ridges have a wavelength of >500 meters whereas sand waves have a wavelength of approximately 200 meters. The NW-SE trending sand waves coalesce in en echelon fashion to produce the larger NNW-SSE trending ridges.

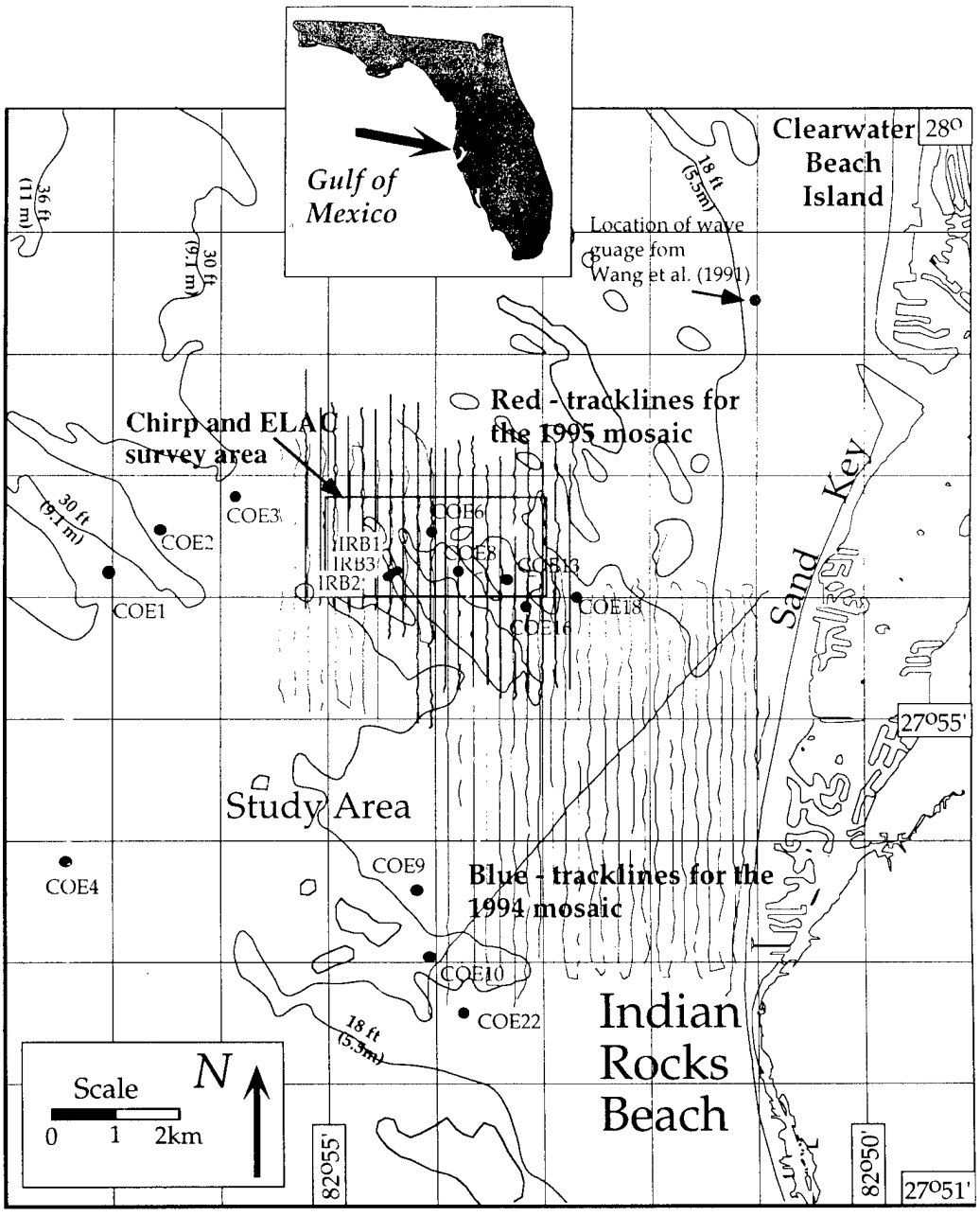


Figure 27. Tracklines for the 1994 (blue) and 1995 (red) side-scan sonar mosaics with locations of cores IRB 1-3 which transect a sand ridge. Other cores (COE) are from another investigation but are used to provide additional ground truth (modified from Harrison, 1996). The area surveyed by chirp vertical beam sonar and ELAC swath-beam sonar is outlined in green.

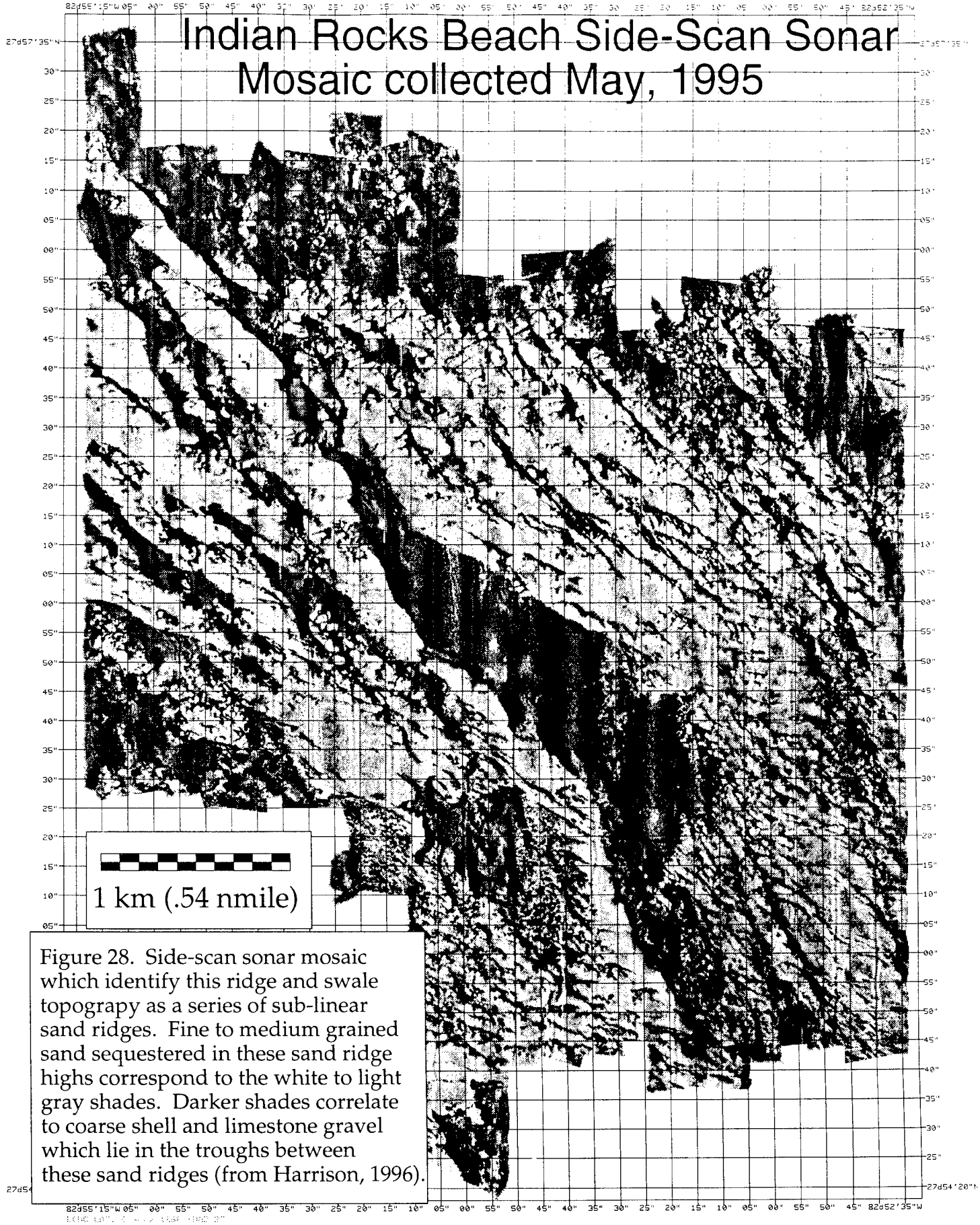


Figure 28. Side-scan sonar mosaic which identify this ridge and swale topograpy as a series of sub-linear sand ridges. Fine to medium grained sand sequestered in these sand ridge highs correspond to the white to light gray shades. Darker shades correlate to coarse shell and limestone gravel which lie in the troughs between these sand ridges (from Harrison, 1996).

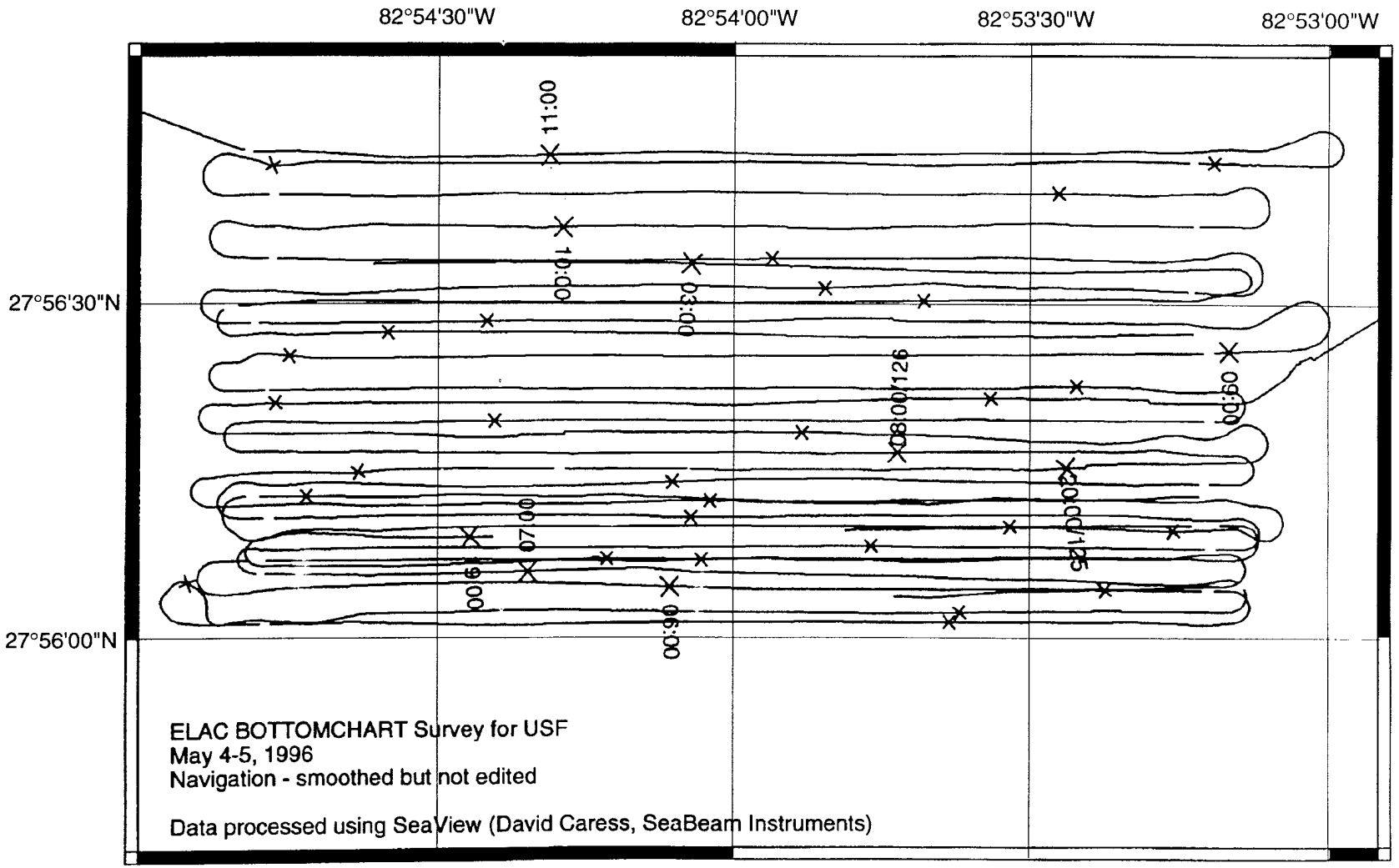


Figure 29. Cruisetracks from the ELAC swath-beam sonar survey. Data are presented in Figures 30-32.

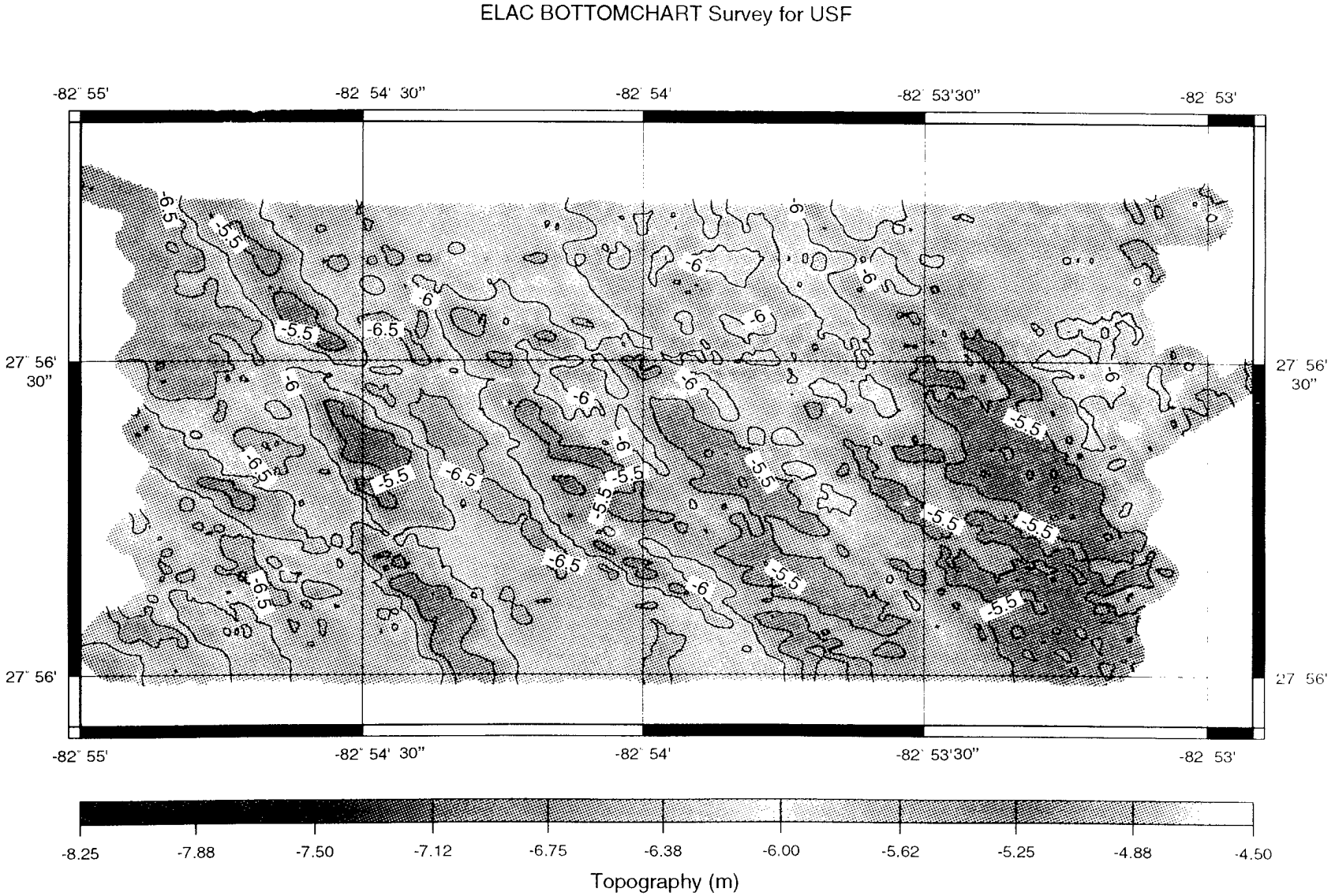


Figure 30. Map view of ELACS bathymetry data. Contoured at .5 m.
Raw bathymetry gridded to 5 m by 5 m bins, spline interpolated to fill in 100 m gaps.

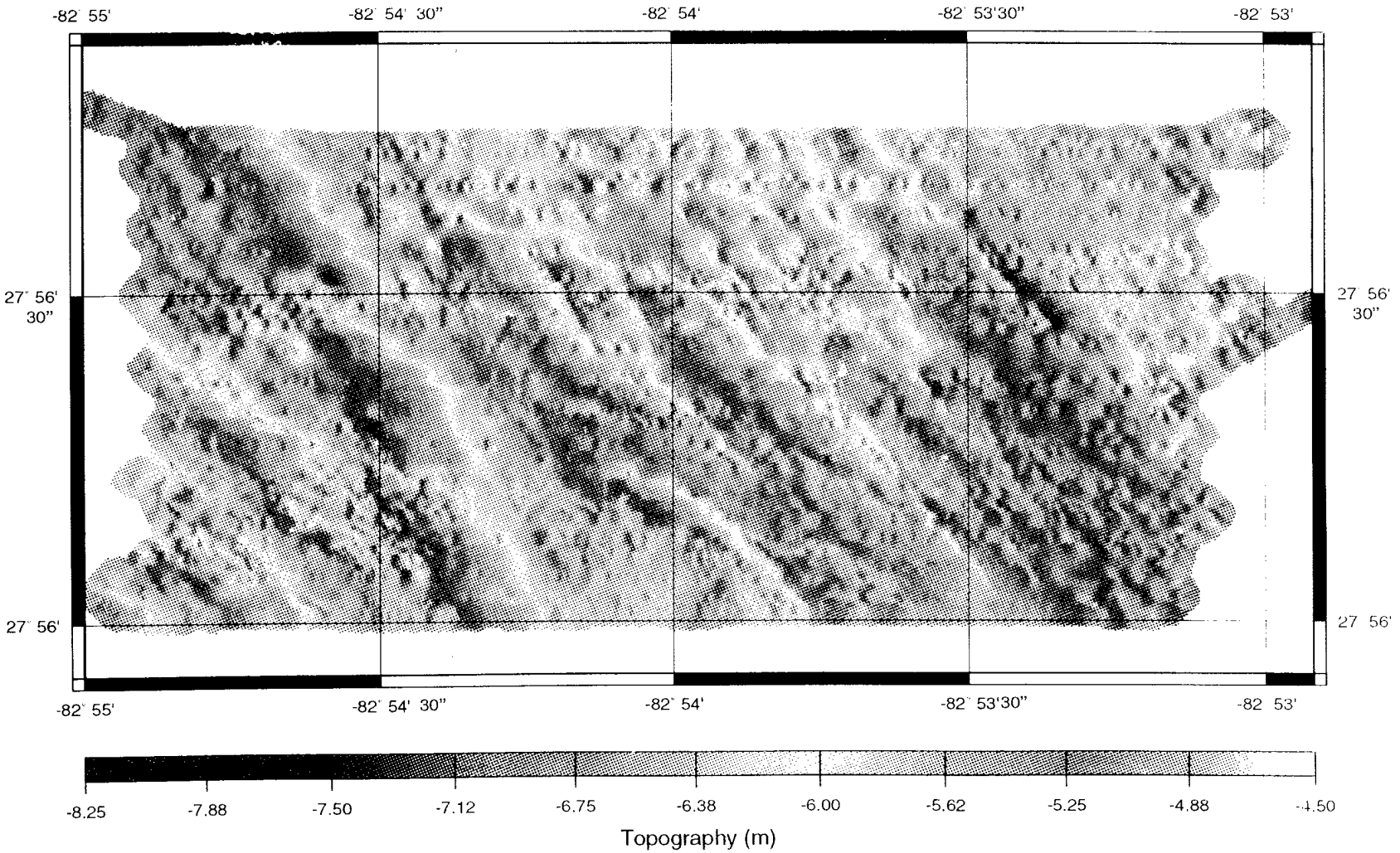


Figure 31. Shaded relief view of ELACS bathymetry data, illuminated from the east. Raw bathymetry gridded to 5 m by 5 m bins, spline interpolated to fill in 100 m gaps.

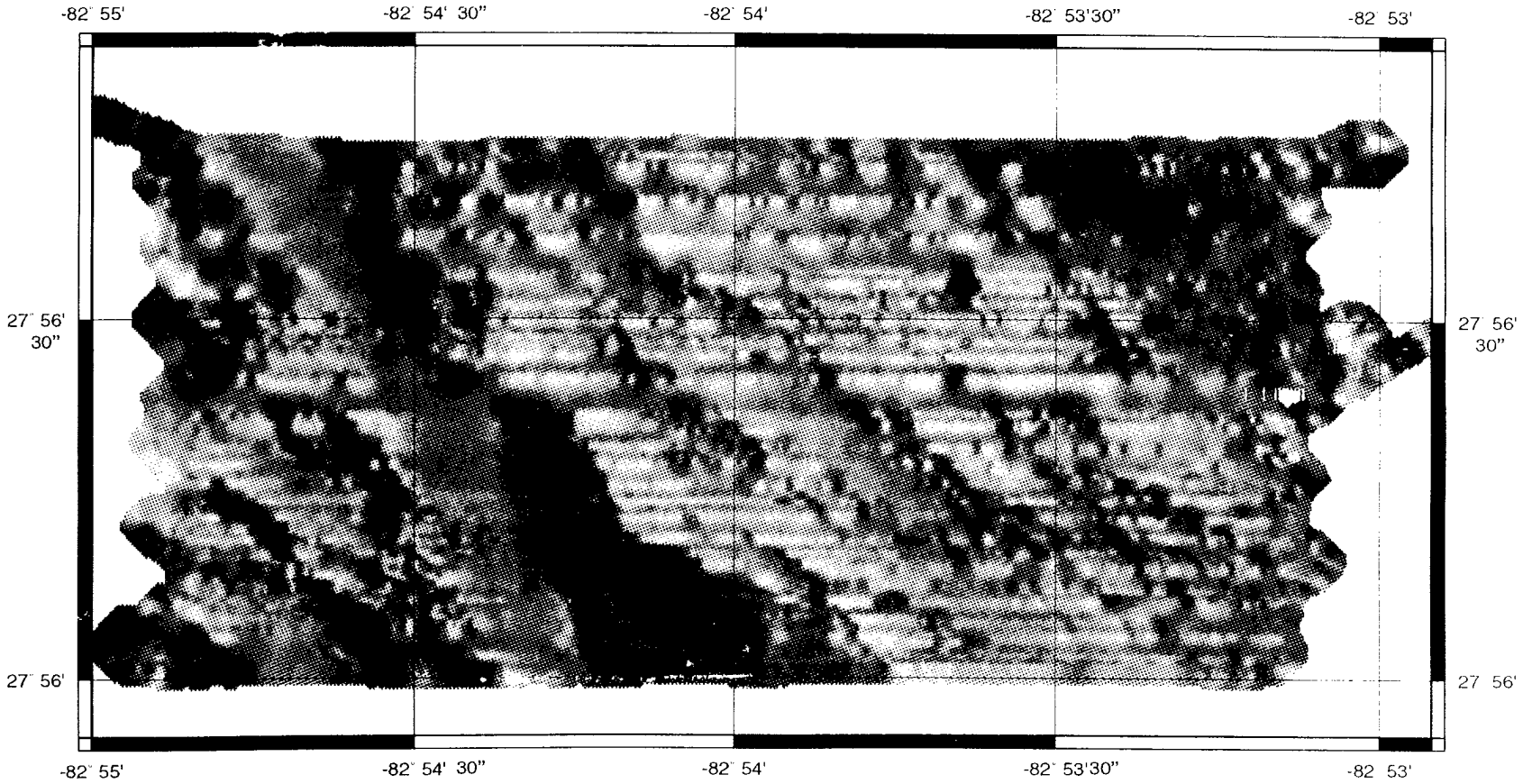


Figure 32. Map view of ELACS amplitude data. Large amplitudes shown as dark with histogram equalization.

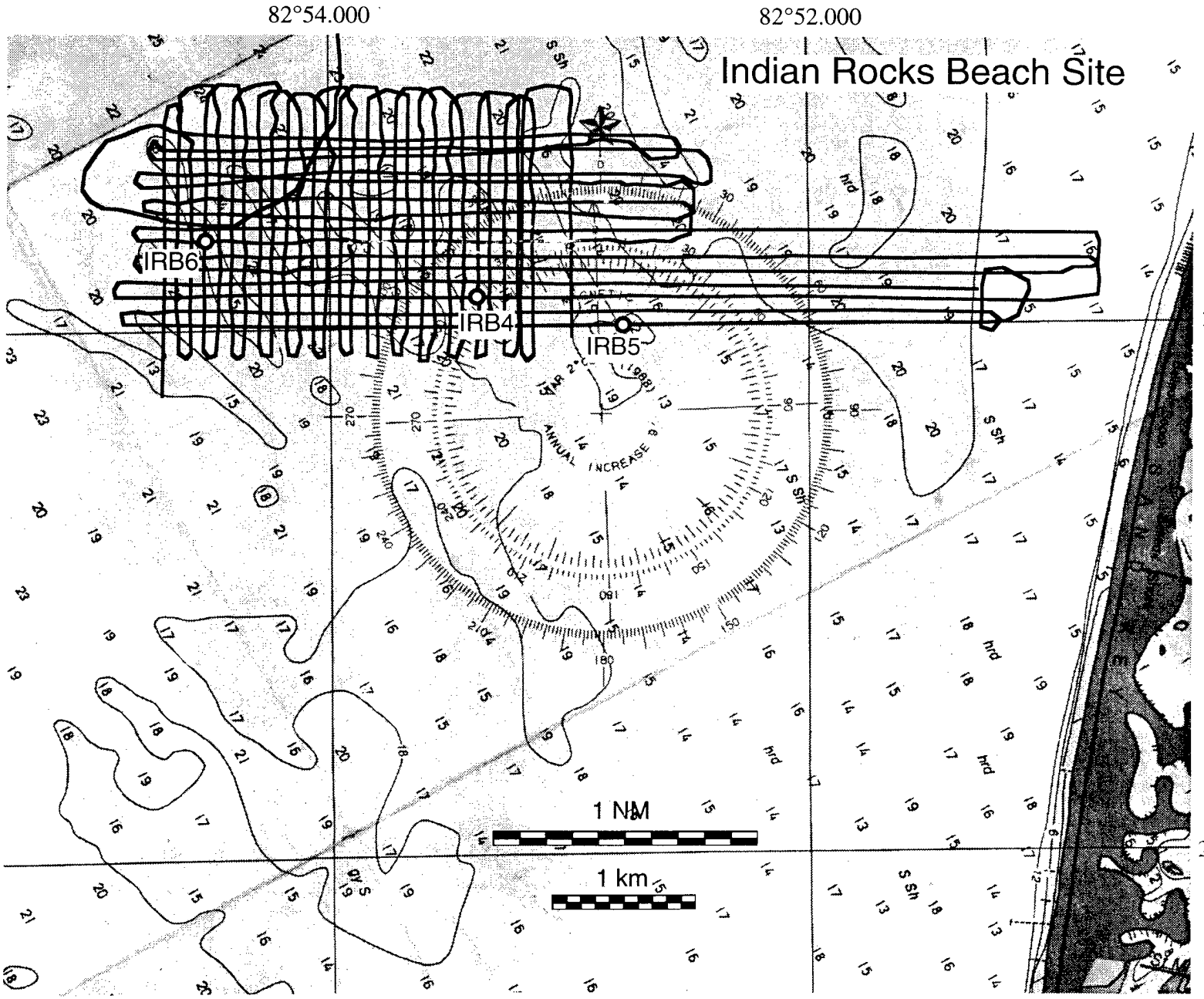


Figure 33. Chart showing tracklines for the chirp sonar survey grid, and ground truth locations (IRB4, IRB5, IRB6) in the Indian Rocks Beach test bed area.

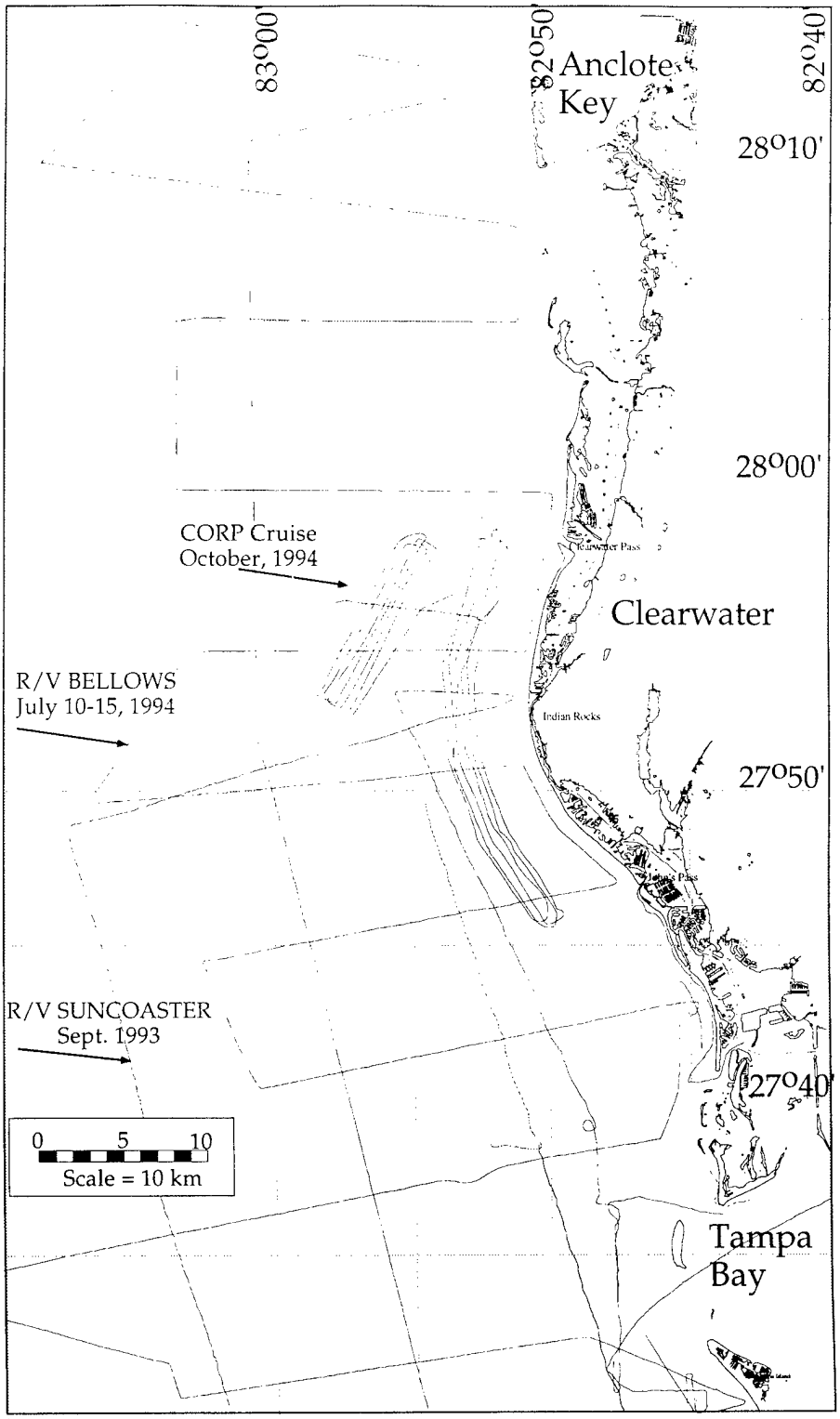


Figure 34. Tracklines where seismic data are available.

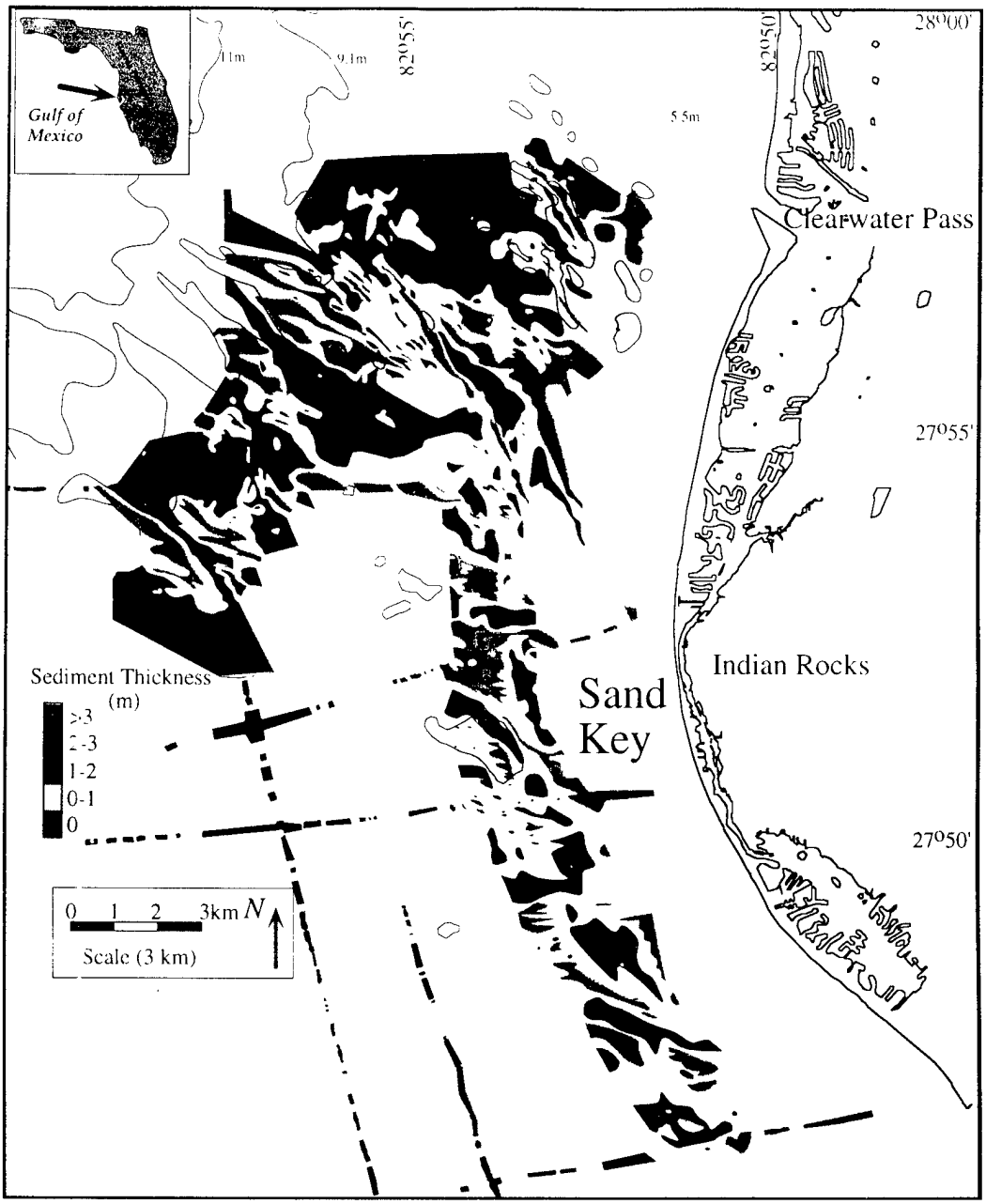


Figure 35. Sediment thickness isopach map displaying thickness of sand ridges offshore Sand Key. Note that sediment thickness and trend of these ridges match the offshore bathymetry which has been digitized from a 1983 NOAA bathymetric map (from Locker, 1995).

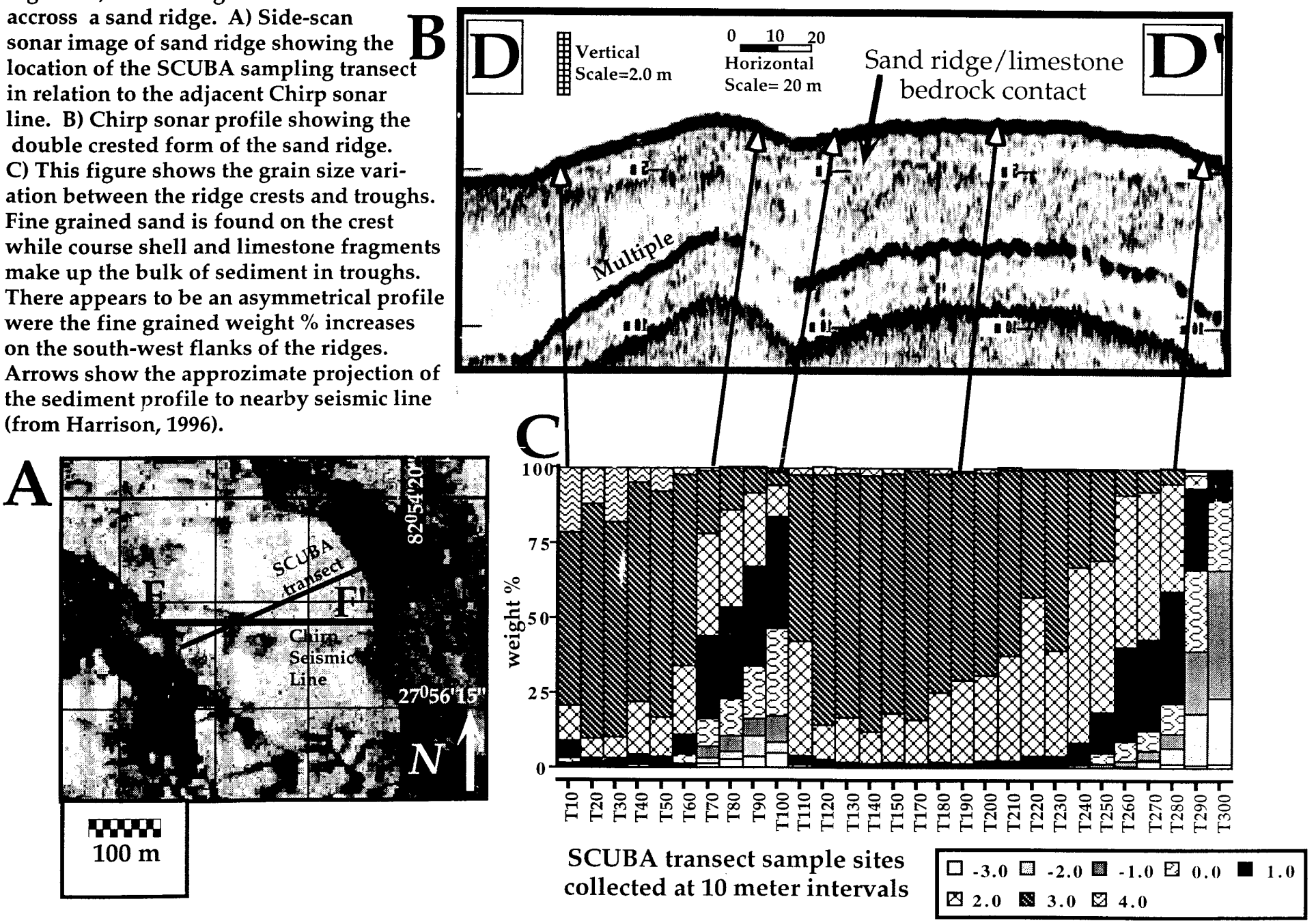
Mineralogic-Petrologic Framework

Sediments comprising the sand ridges are a mixture of well sorted, fine to very fine-grained quartz sand (predominantly in the 4 to 3 phi size range), carbonate skeletal grains, carbonate intraclasts, and, in lesser amounts, phosphorite grains. Mean grain sizes in diver cores from this study area are the coarsest of all the study areas. Mean phi at the top of core IRB6-2 is 1.1 to 1.7 phi, with grain size increasing to 0.26 phi at 8 cm (Appendix A). Gravel increases downward from 7.1% at the surface to 33.6% at 8 cm. The mud content is very low, less than 0.1 wt.%. The % insoluble residue (dominantly quartz) is slightly less than in the Boca Raton site, ranging from 22 to 40 wt.%.

Divers recovered surface sediment grab samples across two sand waves which comprise a sand ridge (Fig. 36). These samples show that grain size is coarsest along the northeast facing slopes and troughs of the sand ridges (Harrison, 1996). Sediment is finest on the crest of sand waves.

Vibracores which penetrated the sand ridges (Figs. 37, 38, 39) recovered several sedimentary facies (Harrison, 1996). The lowermost facies recovered is a blue-green clay grading upward into a non-fossiliferous carbonate facies consisting of white, chalky, brecciated limestone and stringers of quartz sand. Overlying the carbonate facies is a tan, fine-grained quartz sand and shell facies. An organic-rich silt facies underlies the quartz sand facies in core IRB-95-2. The tan sand and shell facies is abruptly overlain by a dark gray carbonate gravel, including limestone intraclasts, coral fragments, and large highly abraded shells. This gravel facies grades and fines upward into the sand ridge facies composed of fine to very fine quartz sand (3 to 4 phi) with better preserved, finer shells, and gray limestone intraclasts. Index properties (velocity, density, etc.) were not determined on the vibracores because of the inherent loss of original fine structure resulting from the vibration.

Figure 36; Sediment grain size variation accross a sand ridge. A) Side-scan sonar image of sand ridge showing the location of the SCUBA sampling transect in relation to the adjacent Chirp sonar line. B) Chirp sonar profile showing the double crested form of the sand ridge. C) This figure shows the grain size variation between the ridge crests and troughs. Fine grained sand is found on the crest while course shell and limestone fragments make up the bulk of sediment in troughs. There appears to be an asymmetrical profile were the fine grained weight % increases on the south-west flanks of the ridges. Arrows show the approzimate projection of the sediment profile to nearby seismic line (from Harrison, 1996).



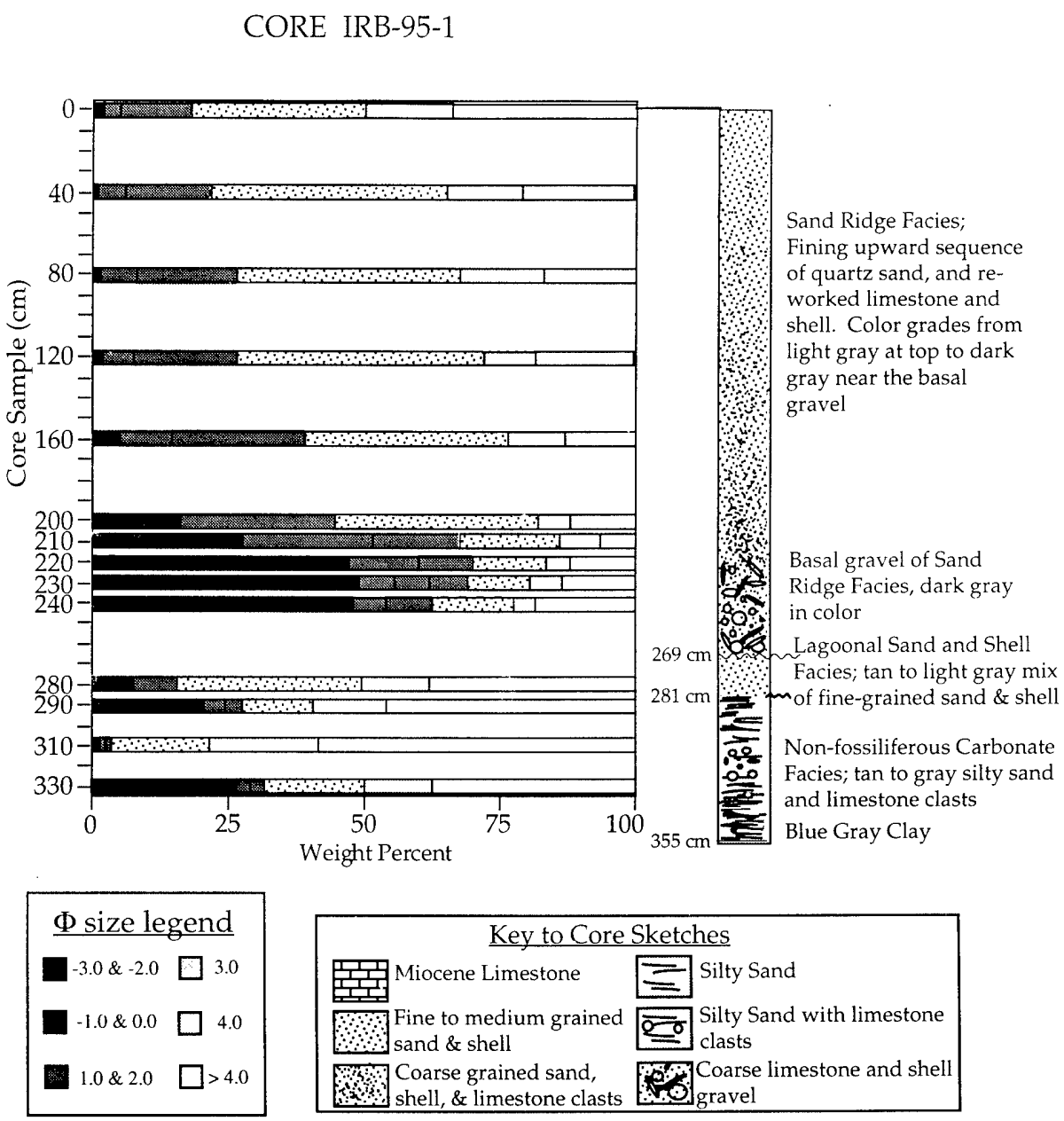


Figure 37. Description of core IRB-95-1 and grain size distribution. Location of ravinement surface is displayed (from Harrison, 1996).

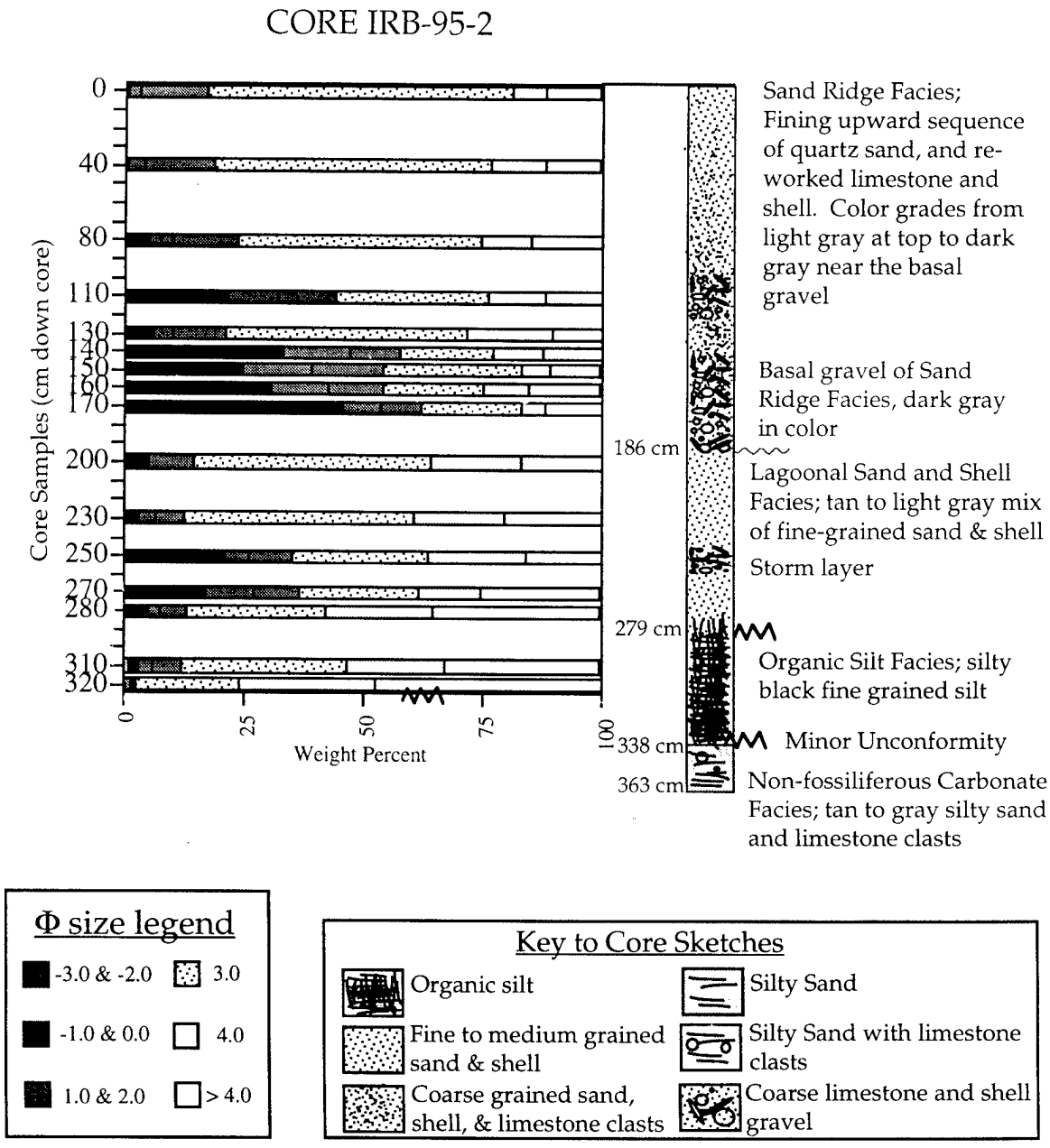


Figure 38. Description of core IRB-95-2 and grain size distribution. Location of ravinement surface is displayed (from Harrison, 1996).

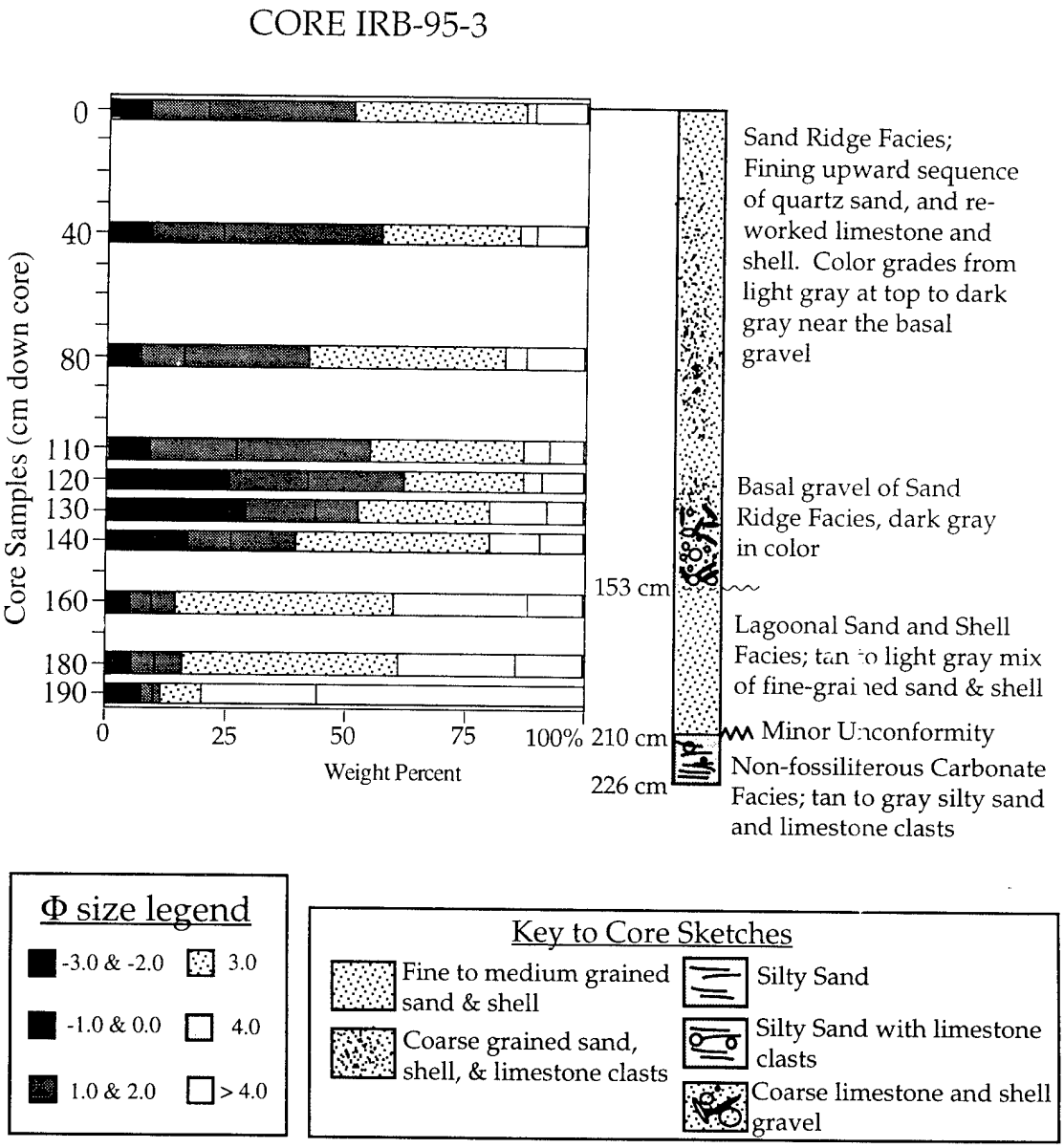


Figure 39. Description of core IRB-95-3 and grain size distribution. Location of ravinement surface is displayed.

Geophysical-Geoacoustic Framework

Chirp sonar data reveal minor reflectors within the sand ridges (Figs. 40-43), although the reflectors are near the limits of resolution. No internal structure is apparent in the seismic data. A horizontal reflector is apparent beneath the sand ridges, in some instances, and corresponds in depth to a continuation of the flat seafloor between ridges. Chirp sonar and seismic data reveal that the underlying limestone may be quite variable in relief.

Acoustic velocities range from 1542 ms^{-1} (a surface measurement which may be erroneous) to 1773 ms^{-1} (Fig. 44). Sediment wet bulk densities average 2.05 gcm^{-3} with little variation. The resulting impedance values range from approximately 3.4 to 3.6 x 10^6 $kgm^{-2}s^{-1}$. Overall, the conditions are quite similar to the Boca Raton site.

Discussion

Sedimentary facies identified in the vibracores reveal a depositional history beginning with a possible highly weathered calcrete and soilstone breccia developed upon older (possibly Miocene) clays. The contact between the carbonate facies and the organic-rich facies is a marine flooding surface indicating sea-level rise, indundation of the area, and development of shallow, probably back-barrier lagoonal conditions. The organic-rich silt facies has a radiocarbon age of 5400 years BP suggesting that it developed under approximately 3 meters of water (Harrison, 1996; Wright, 1995). The foraminiferal assemblage is dominated by *Broeckina/Parasorities orbitoloides*, which is a warm water, possibly hypersaline, epifaunal foram common to sea grass beds, lagoons and nearshore environments (Harrison, 1996; Hallock et al., 1993). The tan sand facies may be lagoonal or shallow marine as radiocarbon dating of foraminifera sets the age at 3420 years BP which suggests deposition at approximately 6 meters water depth (Wright, 1995).

Harrison (1996) interprets the gravel layer as resulting from sand ridge migration, as opposed to transgression and shoreface erosion, based on foram radiocarbon ages of <3400 years. The fining upward trend in the sand ridge facies may have formed by sand

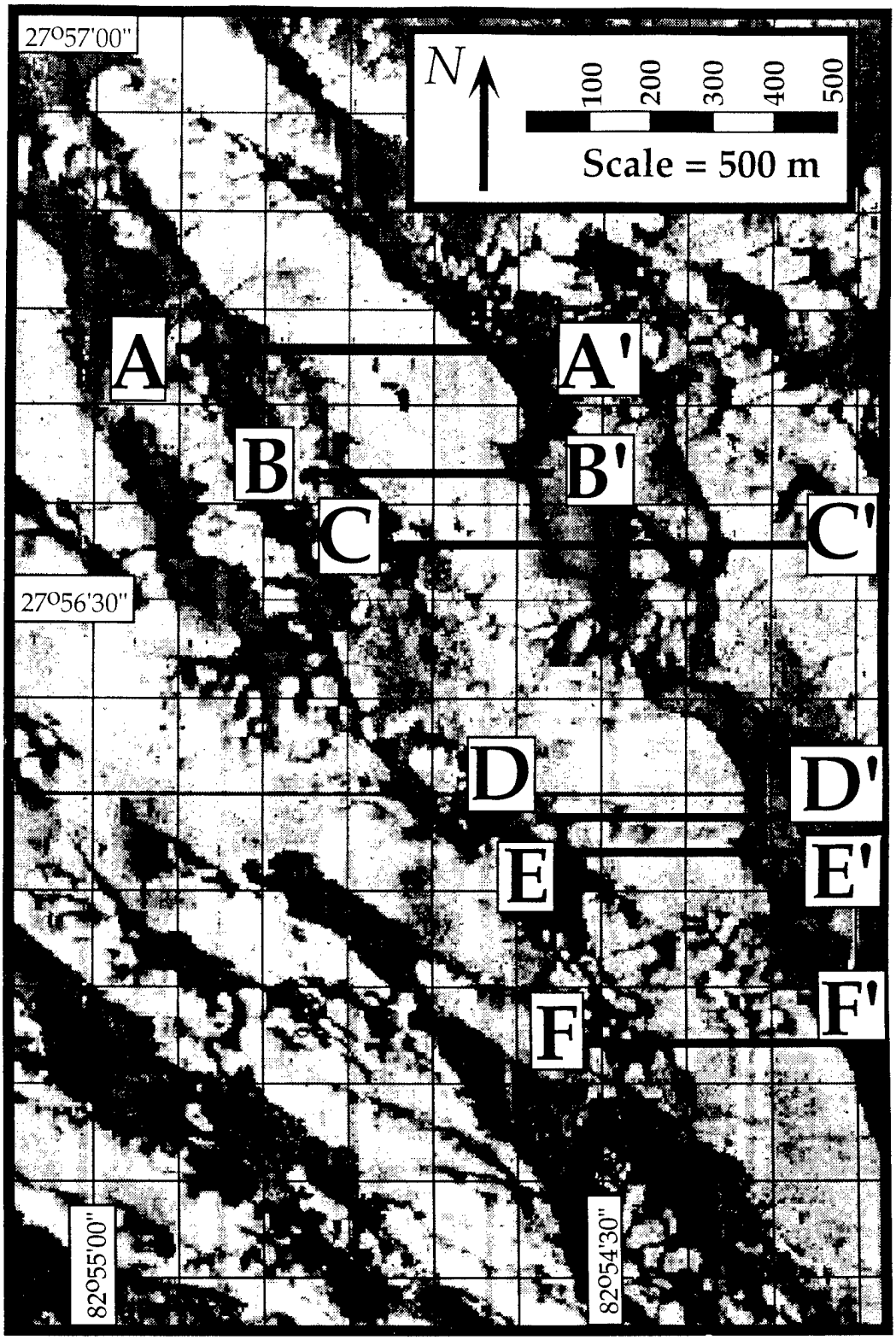


Figure 40. Side-scan mosaic displaying the locations of six chirp sub-bottom profile lines transecting a sub-linear sand ridge. Water depths in this region range from 6-9.5 m. Chirp data are presented in Figures 41-43 (from Harrison, 1996).

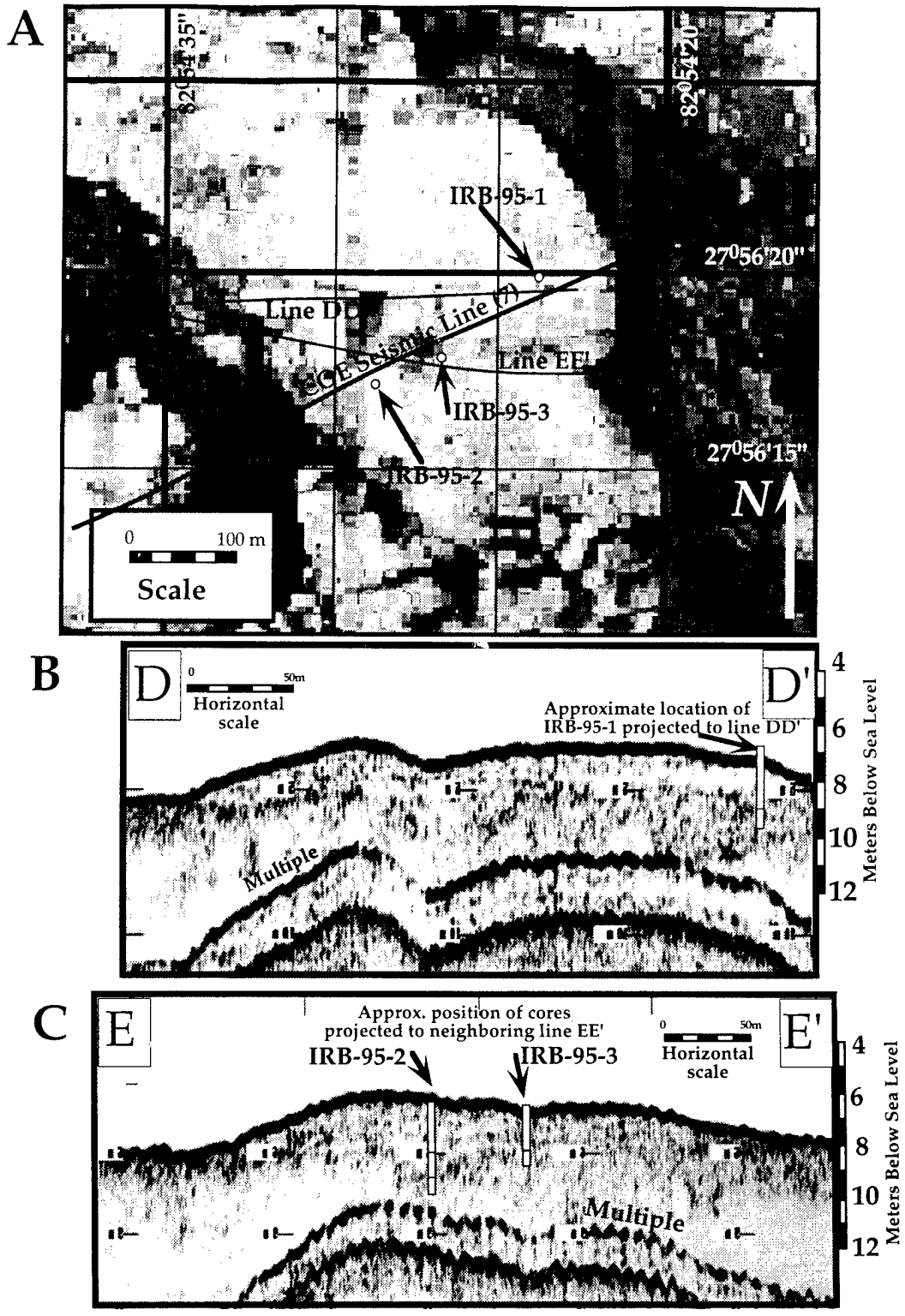
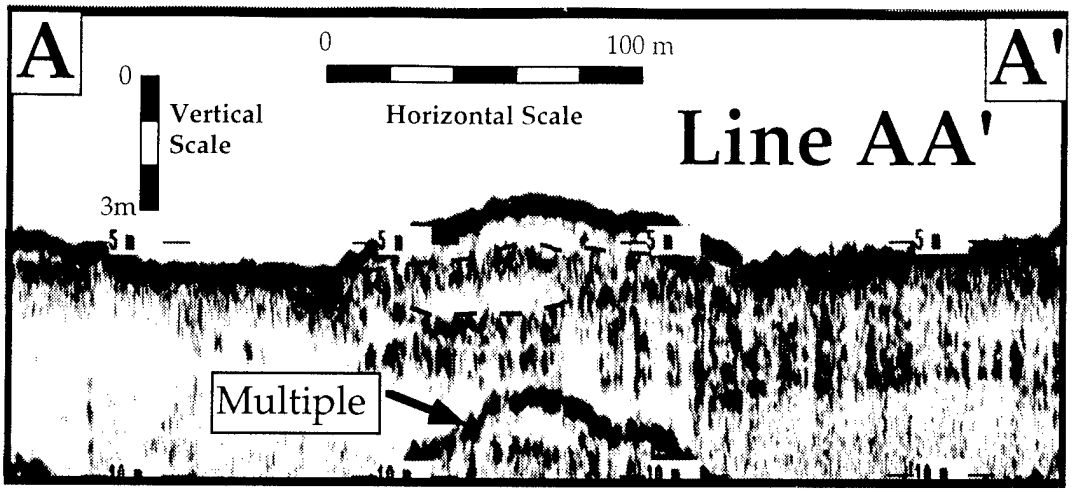


Figure 41. A) This is an enlargement from the May 1995 side-scan mosaic image which displays a sand ridge (white shades) and the surrounding trough containing reworked shell and limestone gravel (darker shades). The location of three cores in relation to three seismic/chirp lines; DD', EE' and Line COE, is also shown. B) Chirp sub-bottom profile Line DD' displaying the double crested sand ridge morphology and the location of IRB-95-1. C) Chirp sub-bottom profile Line EE' of the sand ridge displaying the location of IRB-95-2 as well as IRB-95-1 (from Harrison, 1996).



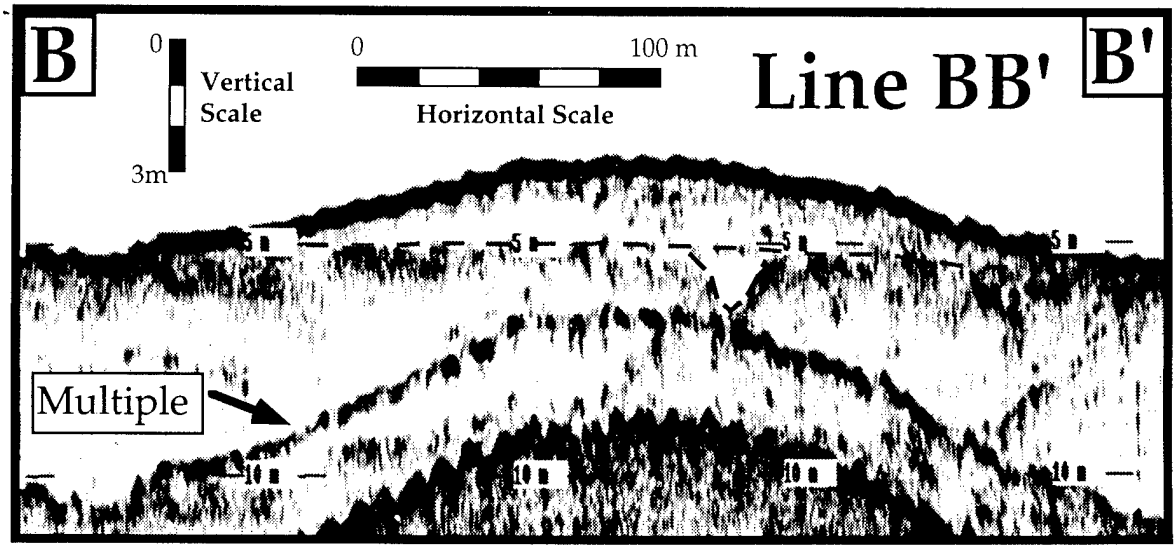


Figure 42. Chirp sub-bottom profile lines AA' and BB'. Line AA' depicts a sand ridge cross section with dark convex upward internal reflector outlined by the dashed grey line. There is a second prominent reflector below this outlined by the black line. There is no vibracore data in this region to identify the nature of these reflectors. Line BB' shows a more continuous reflector at the base of the ridge and is outlined by the dashed gray line. There also appears to be a channel feature below this ridge which is outlined by the black dashed line.

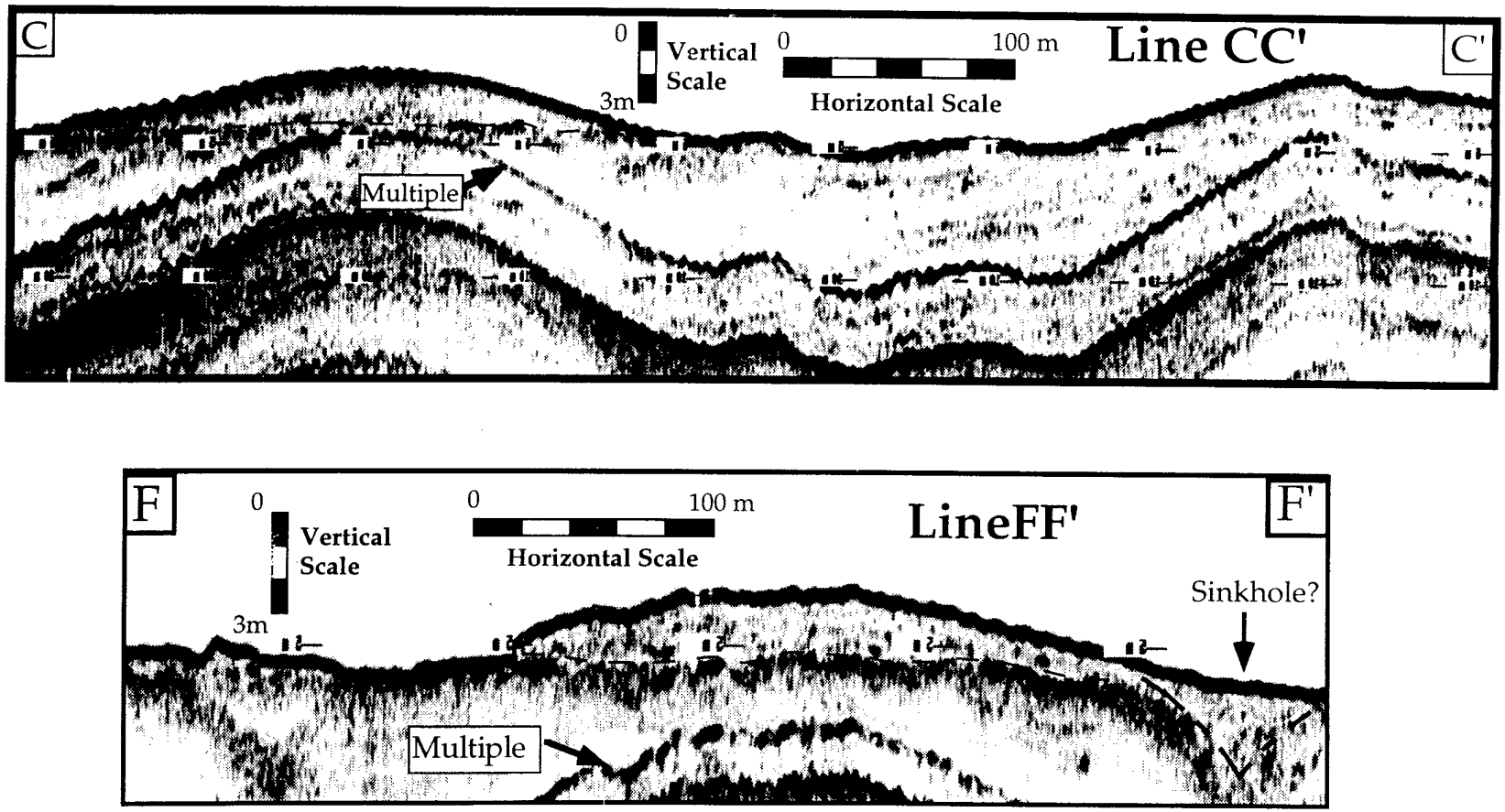


Figure 43. Chirp sub-bottom profiles CC' and FF'. Line CC' displays two sand ridges separated by a trough. The ridge in Line FF' appears to be bounded on its eastern edge by a potential collapse feature in the limestone bedrock. The base of the sand ridge facies in each line appears to be a fairly flat, continuous feature. Where this reflector is traceable, it has been outlined by a dashed line (from Harrison, 1996).

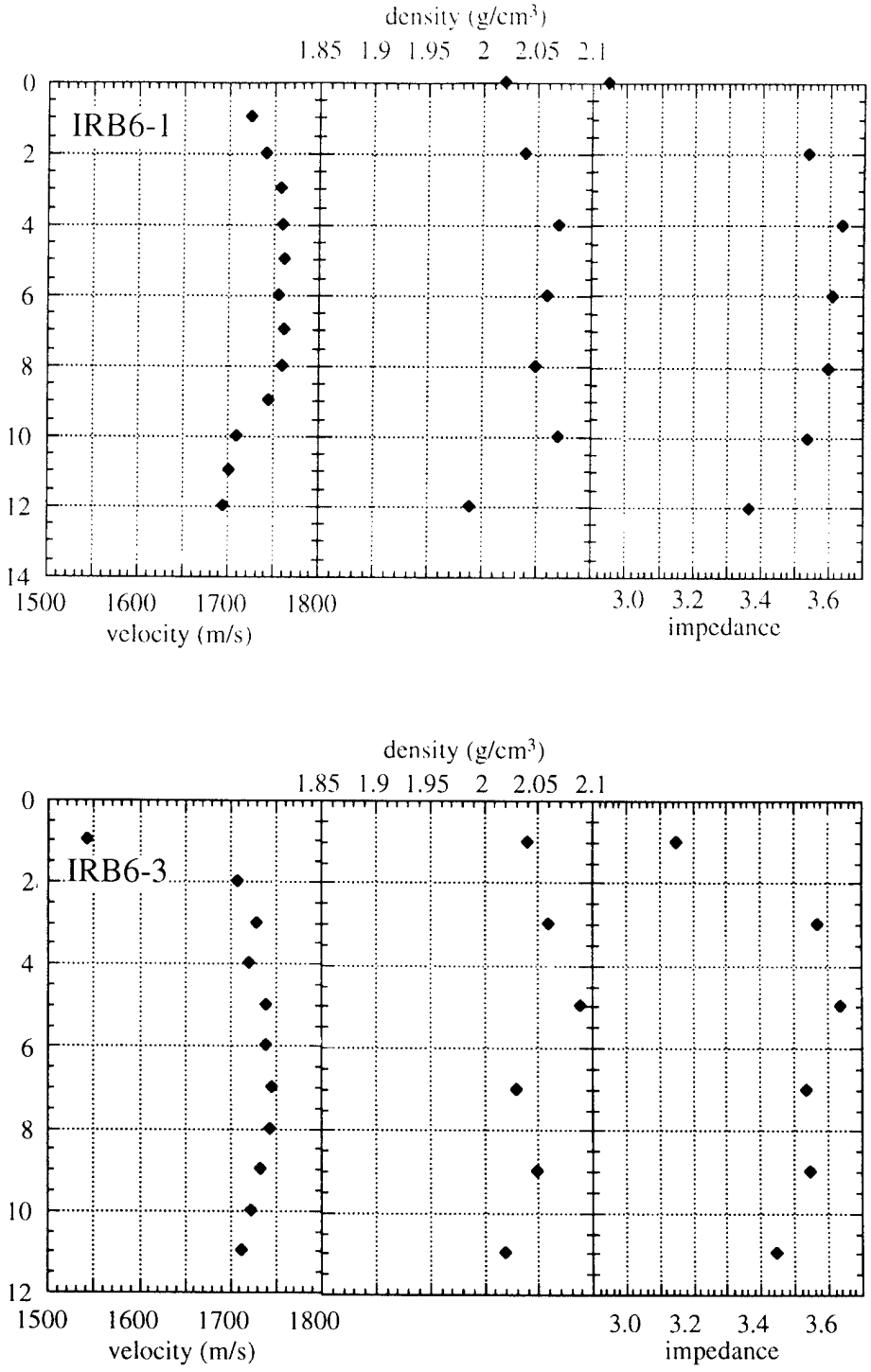


Figure 44. Graphs of p-wave velocity, wet bulk density and impedance from diver cores collected in the Indian Rocks Beach study area.

ridge migration or by accretion under decreasing energy levels with increasing water depth. The asymmetry of ridges and grain size variation across the ridges (Fig. 35) indicate a dominantly southerly current flow.

The 100 kHz side-scan sonar mosaic (Fig. 28) clearly reveals the sand ridge and wave morphologies for the first time. The ridges show low backscatter (light areas) as a result of their relatively finer sediment. The troughs and seafloor between ridges and waves show high backscatter (dark areas) resulting from the presence of coarse gravel lags and limestone outcrops (based on diver observation and seismic data). Harrison (1996) utilized two sets of side-scan sonar data collected six months apart to assess the possibility of sand ridge movement and variations in morphology. The data suggest that the northern flank of some ridges may have shifted southward by 1 to 5 meters in response to winter storm fronts, which create a southerly current flow. In one case, a portion of a ridge appears to have shifted southward by 15 to 20 meters. Southern flanks of ridges appear to migrate much less than northern flanks. Although there are still uncertainties in estimations of the accuracy of the measurements, it does appear that the bedform morphology adjusts to equilibrate with ambient bottom energy levels. This is an important detail to understand in regards to deploying instruments on the seafloor. Although large bedforms may appear stable over years or decades based on local charts, there still may be short-term, even seasonal, mobilization of surficial sediments which can bury or expose objects (mines, sensors, etc.). Consideration must be given to local current vector fields (including tidal currents, longshore currents, shelf currents, storm-induced currents, and the intensity, frequency and duration of storm events), and the seafloor sediment texture and bottom morphology to prevent the undesired burial or excavation of deployed instruments.

As stated above, the mineralogic and textural characteristics are very similar to the Boca Raton site. Index properties, determined on diver cores, indicate that densities in the IRB cores are significantly less than in Boca Raton cores. The lower densities in the IRB

cores reflect greater porosity suggesting that the IRB sand ridge surface sediments are more mobile than the sediments in the Boca Raton area.

SECTION IV. LOWER TAMPA BAY

Geologic Framework

Investigations of the Lower Tampa Bay site and Egmont Key site were cut short as a result of Hurricane Alison and a subsequent red tide event. Cores and acoustic data from these areas have not been examined in the same detail as the other sites.

Lower Tampa Bay is a low energy, siliciclastic sand and mud dominated estuarine environment. Approximately 150 km of chirp vertical beam sonar data were acquired within the Lower Tampa Bay area (Fig. 45). Track lines are oriented north-south and east-west and are spaced at 200 meter intervals. Total coverage is approximately 16 km^2. Three sites were evaluated using the ISSAMS, and sixteen diver cores were taken.

Approximately 8 km of chirp sonar data were acquired over an area of approximately 1 km^2 within the Egmont Key study area (Fig. 46). Track lines are oriented north-south and east-west. Two sites were evaluated using the ISSAMS, and six diver cores were taken.

Mineralogic-Petrologic Framework

Sediments within Lower Tampa Bay are poorly sorted, mixed carbonate and siliciclastic muddy sands (Appendices A and D). Mud content exceeds 10%. Mean grain size is 2.4 to 2.6 phi. Mineralogy has not yet been determined on these cores.

Geophysical-Geoacoustic Framework

A sample of the chirp data from Lower Tampa Bay is shown in Figure 47. Acoustic penetration in this area was excellent as a result of the muddy nature of the sediments. Surficial sediment reflection coefficients based on chirp sonar data from the Lower Tampa Bay site range from approximately -8 to -10 dB (r = 0.4 to 0.32). Acoustic

Lower Tampa Bay Site

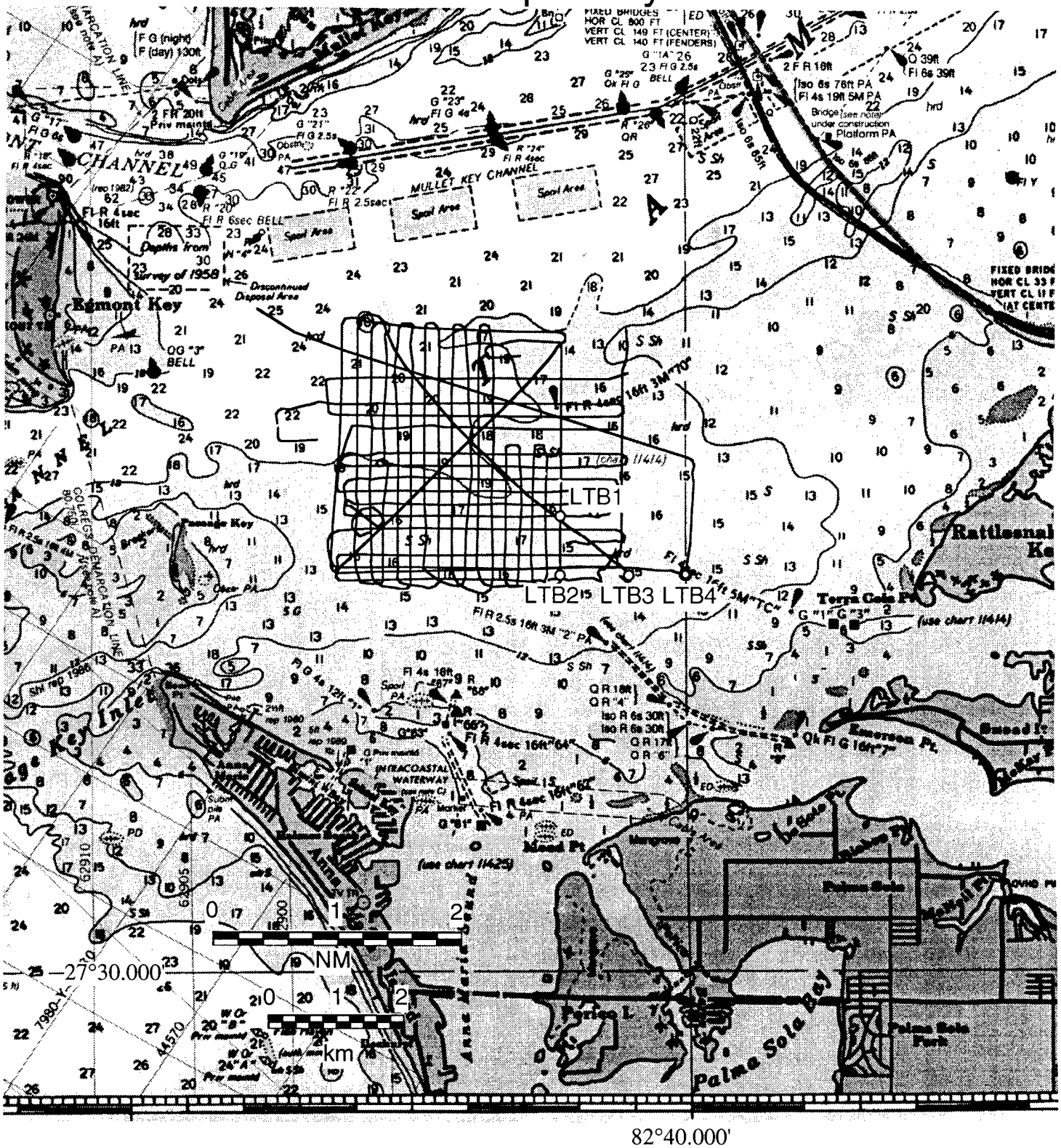


Figure 45. Chart showing tracklines for the chirp sonar survey grid, and ground truth locations (LTB1-4) in lower Tampa Bay.

Egmont Key Site

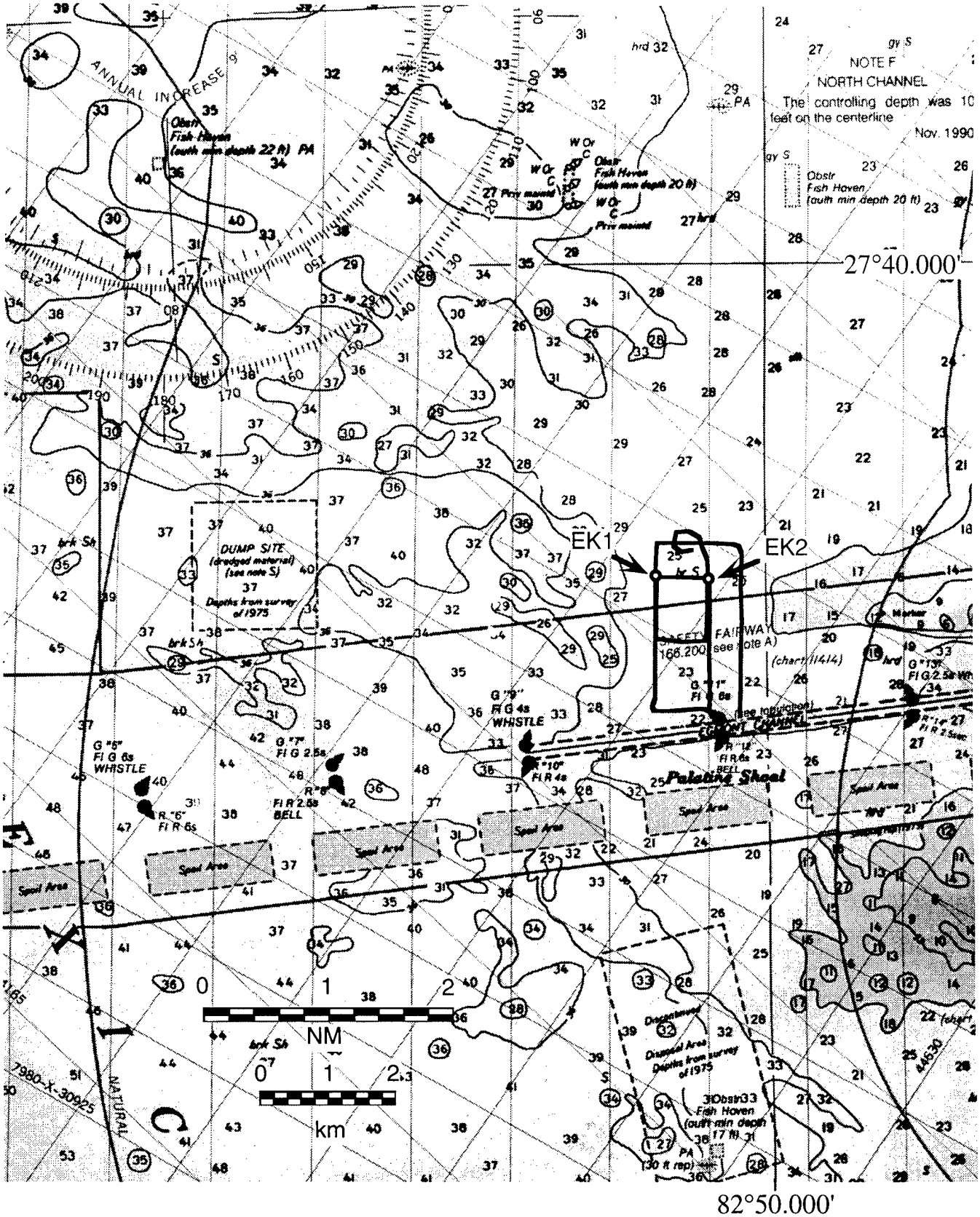


Figure 46. Chart showing tracklines for the chirp sonar survey grid, and ground truth locations (EK1, EK2) in the Egmont Key site.

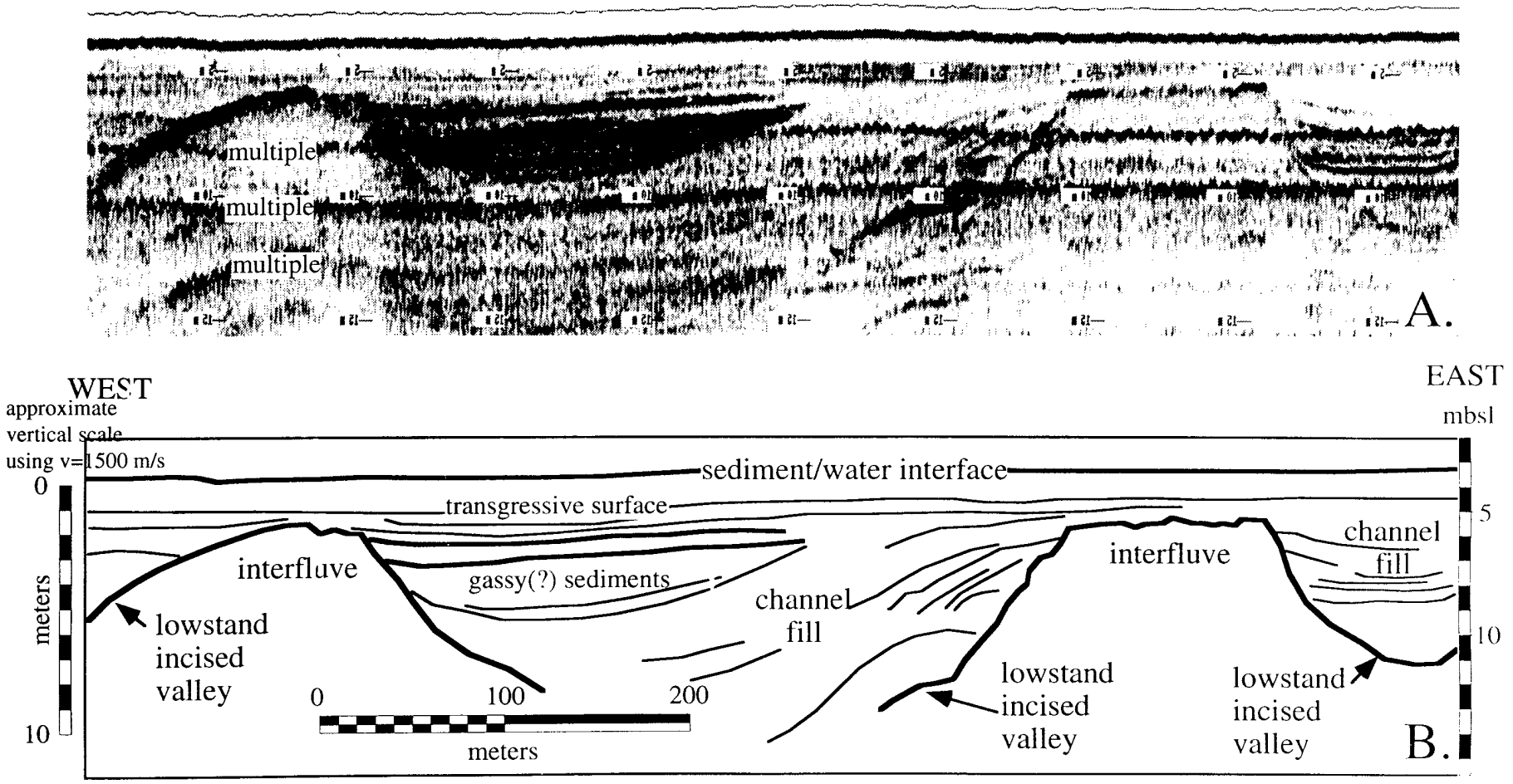


Figure 47. A) A portion of the chirp vertical beam sonar data from Lower Tampa Bay. B) Interpretation of the raw data showing incised fluvial valleys formed during the last glacial maximum, prograding channel fill, high amplitude gassy(?), probably organic-rich palustrine or lagoonal sediments, and the Holocene transgressive surface. Deep acoustic penetration at this site is facilitated by the muddy nature of the sediments.

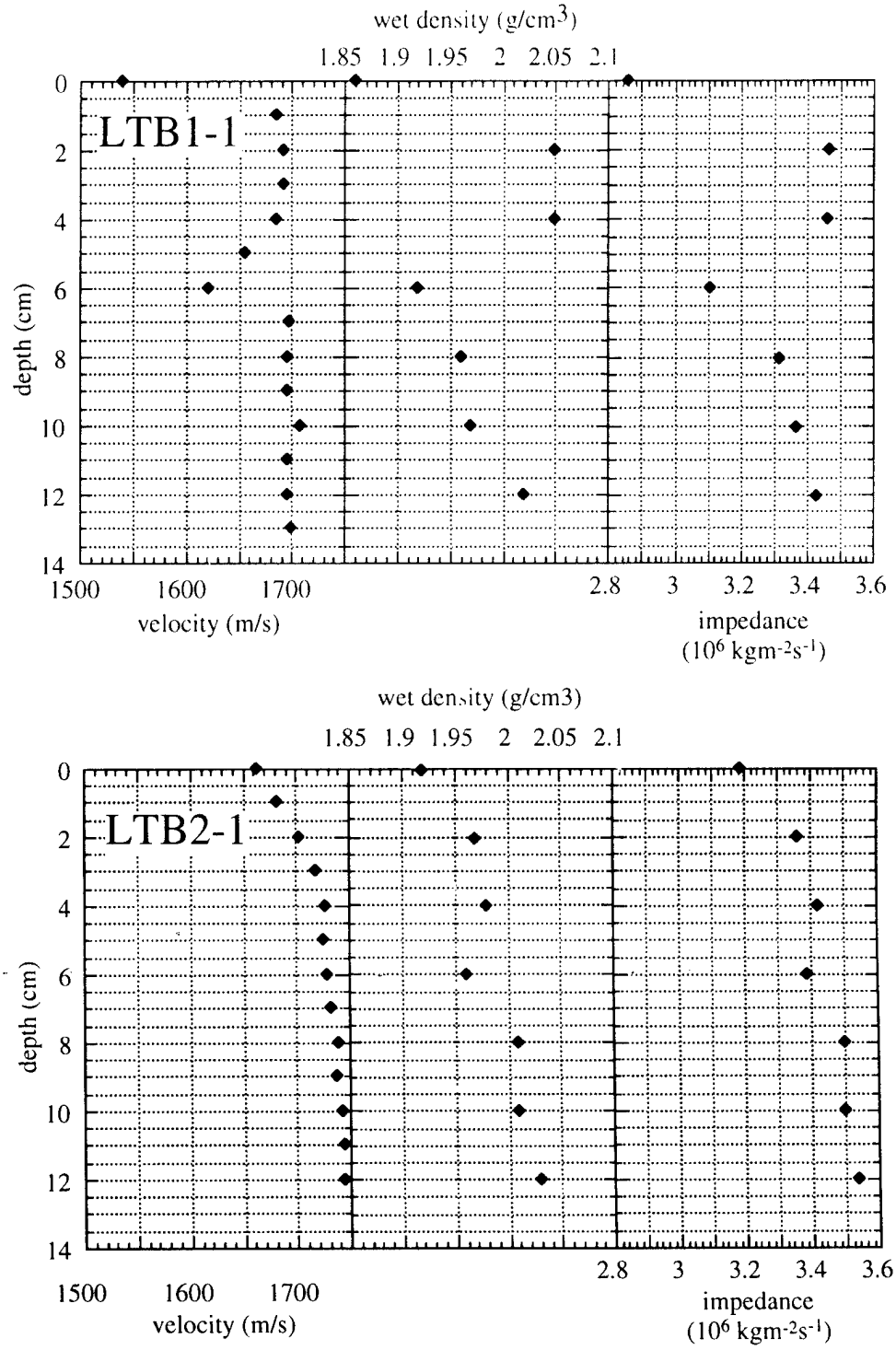


Figure 48. P-wave velocity, wet bulk density, and impedance data from lower Tampa Bay diver cores.

velocity averages 1686 ms^{-1}. Wet bulk density averages 2.0 gcm^{-3}. Resulting impedance averages 3.36 x 10^6 $kgm^{-2}s^{-1}$.

Discussion

Chirp sonar data from the Lower Tampa Bay site show the subsurface geology to consist of an incised valley complex with three major channels separated by large interfluves (Fig. 47). The channels are up to 10 meters in depth and 400 meters across on sonar records (narrower in actual cross-section). Interfluves are approximately 100 meters in width. Clinoforms prograde from interfluves in a westerly direction indicating channel filling from the east. A series of very high amplitude reflectors occurs within the channel fill. These are probably gassy sediments associated with organic-rich palustrine deposits. A horizontal reflector approximately 1 meter below the seafloor is interpreted as the Holocene marine flooding surface marking initial inundation of the Tampa Bay area and establishment of the estuarine system.

Sediment velocities and densities are lower than in the Indian Rocks Beach and Boca Raton areas, but higher than the Dry Tortugas sediments (Appendices A and D). Impedance values are therefore intermediate.

SECTION V. INTEGRATED DISCUSSION OF GEOLOGIC AND GEOACOUSTIC PARAMETERS

Acoustic and physical data are compared in Figure 49 a-i. Impedance is presented on the x-axis so that the regression equation can be used to determine a particular physical quantity (y-axis) based on impedance inversion. It is readily apparent that there are two impedance fields (Fig. 49 a-c) when either density or velocity are plotted versus impedance. The sediments of the Boca Raton, Indian Rocks Beach and Lower Tampa Bay sites have a higher impedance for a given density than do the sediments of the Dry Tortugas. Likewise the sediments of the Dry Tortugas have lower velocities overall, and lower velocities for a given impedance value than the other sites.

Hamilton et al. (1982) found a similar trend in deep sea sediments where shallower-water, sandy sediments yielded higher impedance values than deeper-water, muddier sediments. Hamilton et al. (1982) determined that the increased impedance in the sandier sediments was a function of higher velocities in these sediments, which is controlled by the degree of interparticle porosity. Their work revealed that as sand percentages declined in these deep water sediments, intraparticle porosity was replaced by interparticle porosity (with little change in total porosity), resulting in decreased velocity. A decrease in interparticle porosity results in more grains in contact, greater sediment rigidity, and greater velocity.

A similar, but weaker relationship is observed between grain size and impedance in sediments from this investigation. Porosity in Dry Tortugas sediments generally exceeds 50% whereas the Boca Raton sediments yield porosities of 35 to 40%. Sediments of the Boca Raton, Indian Rocks Beach, and Lower Tampa Bay sites have coarser sediments, lower interparticle porosity and higher velocities than sediments in the Dry Tortugas (Fig. 49d). There is a moderate positive correlation between % silt and impedance (R=0.74; Fig. 49e) but no correlation between mean grain size and velocity or impedance, and only a very weak positive correlation between mean grain size and density (Fig. 49f). The weak

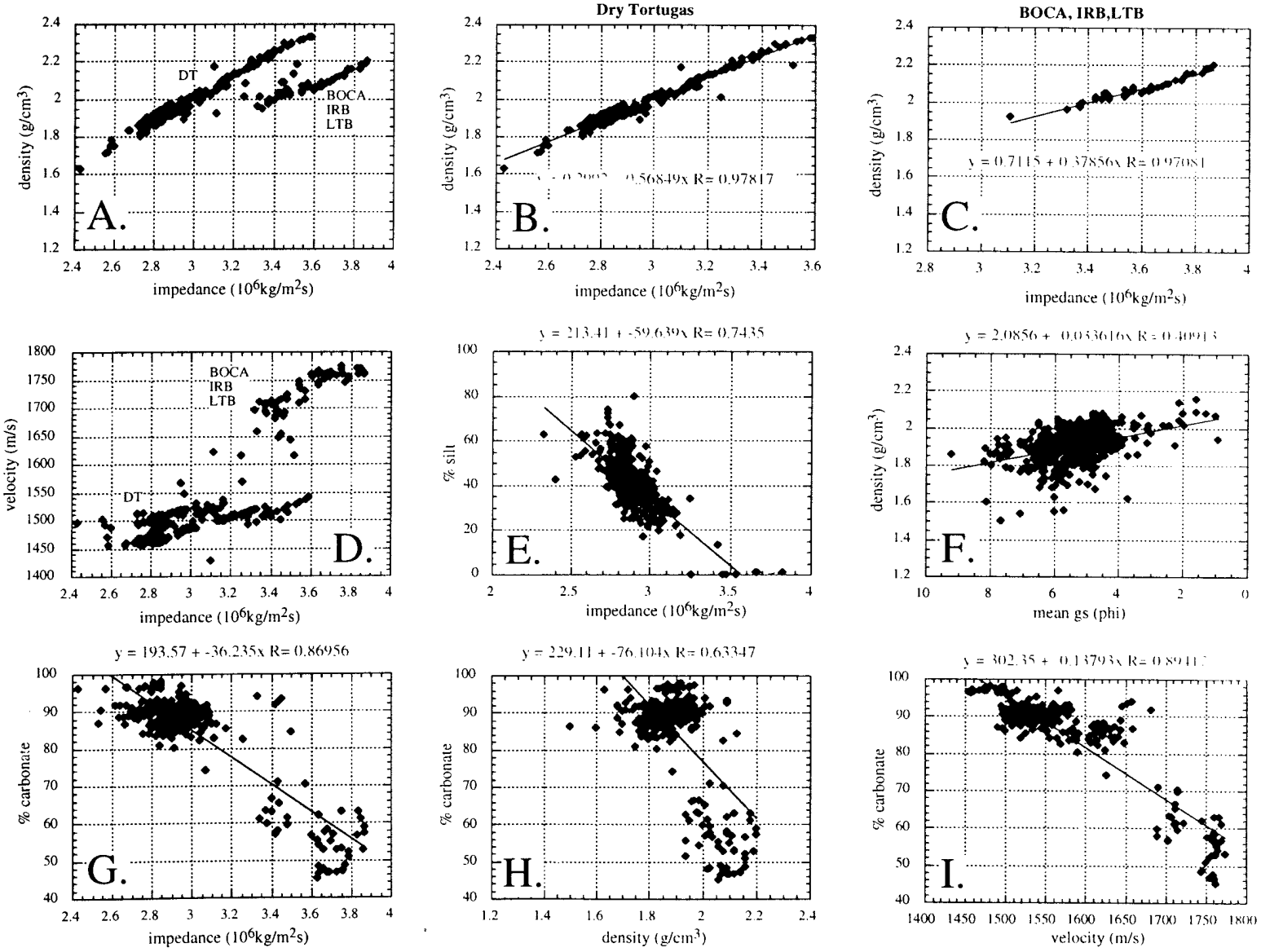


Figure 49. Plots of various sediment physical properties versus acoustic properties as measured on cores from the Dry Tortugas, Boca Raton, Indian Rocks Beach, and lower Tampa Bay sites.

correlation between density and grain size may be a function of complex variations in interparticle/intraparticle porosity ratios resulting from diagenesis. Changes in impedance within sites are apparently controlled by porosity changes, which are an inverse function of density, and are partially related to the amount of silt. As porosity decreases (decreasing silt), density and velocity increase resulting in increasing impedance. There is a greater density range in the Dry Tortugas sediments (Fig. 49a) probably as a result of greater sediment compaction, grain size variation, and diagenesis (dissolution and cementation). Since impedance is the product of density and velocity, the lower densities and velocities of the Dry Tortugas site yield lower impedance values than the other sites.

Another important control on impedance is carbonate versus siliciclastic abundance. Impedance values decrease with increasing carbonate (Fig. 49g). No correlation was found between the carbonate mineral phases present (aragonite, low-Mg calcite, high-Mg calcite, dolomite) and other properties. The correlation of carbonate versus density (R=0.6; Fig. 49h) is not as strong as carbonate versus velocity (R=0.87; Fig. 49i), implying that the impedance change is largely controlled by the inverse relationship between velocity and percent carbonate. The greater velocity and impedance in quartz-rich sediments is probably a function of lower grain densities (as opposed to bulk density). The densities of aragonite, low-Mg calcite, high-Mg calcite, and dolomite are 2.95, 2.71, ~2.75, and 2.85 gcm^{-3}, respectively. Quartz has a density of 2.65 gcm^{-3}. Comparing data from DT232 and the IRB cores illustrates the contribution of mineralogy (Appendix A). Although these cores have similar impedance values (approximately 3.3 to 3.6 x 10^6 $kgm^{-2}s^{-1}$) and grain size, the velocities of the carbonate sediments (DT232) are much lower and the densities much higher than the IRB and LTB sediments. As a result, the quartz-rich sediments yield lower densities for a given impedance value (Fig. 49a).

An estimate of the surface sediment impedance can be derived by inversion based on the reflection coefficients recorded by the chirp vertical beam sonar. The impedance (ρv) may be determined using the following equation:

$$r = (\rho_1 v_1 - \rho_2 v_2)/(\rho_1 v_1 + \rho_2 v_2)$$

where r is the reflection coefficent, $\rho_1 v_1$ is the impedance of the water column, and $\rho_2 v_2$ is the impedance of the surficial sediments. This equation reduces to:

$$\rho_2 v_2 = x / 1\text{-}r$$

where $x = r(\rho_1 v_1) + \rho_1 v_1$. Density and velocity measurements of the water column were made by CTD in the Dry Tortugas area. Average seawater density and velocity was 1.025 gcm^{-3} and 1526 ms^{-1}, respectively, yielding a seawater impedance of 1.56 x 10^6 $kgm^{-2}s^{-1}$. The reflection coefficient recorded in the area of core 205 in the Dry Tortugas site is approximately 0.28 (Table 2). Inserting this r-value into the second equation above yields an impedance value of 2.78 x 10^6 $kgm^{-2}s^{-1}$. The impedance based on the electric logger ranges from 2.56 to 2.74 x 10^6 $kgm^{-2}s^{-1}$ over the top 20 centimeters, slightly less than that estimated by sonar. The reflection coefficient recorded in the area of core 226 is approximately 0.31. This r-value yields a sediment impedance of 2.97 x 10^6 $kgm^{-2}s^{-1}$, whereas the electric log data yield impedance values ranging from 2.76 to 2.95 x 10^6 $kgm^{-2}s^{-1}$ over the top 20 centimeters. In Lower Tampa Bay, chirp-recorded impedance is approximately 3.04 to 3.65 x 10^6 $kgm^{-2}s^{-1}$ whereas ground truth impedance from core LTB1-1 averages 3.36 x 10^6 $kgm^{-2}s^{-1}$ over the top 10 cm. These estimates indicate that the remote acoustically estimated impedance is approximately 1% to 8% higher than the directly measured impedance in the top 20 centimeters of the sediment column. These data will allow calibration refinement. It is possible that the remotely estimated value is a better measure of impedance as the core material is likely to be slightly disturbed.

These data indicate that the mean grain size and percent carbonate versus siliciclastics may be evaluated using acoustic remote sensing and impedance inversion. However, some initial ground truthing for calibration purposes appears necessary. For instance, given an inverted impedance estimate of 3.4 x 10^6 $kgm^{-2}s^{-1}$, the corresponding density of material may be either 2.25 gcm^{-3} in a pure carbonate environment or 2.0 gcm^{-3} in a mixed carbonate-siliciclastic environment. Once the general mineralogic composition is

established, the density (determined by impedance inversion) may be used to determine the mean grain size or percent carbonate (or insoluble residue).

Table 2. Comparison of impedance values for surficial sediments based on chirp data and ground truth data. Ground truth mean and range is determined over the top 20 cm of cores. Impedance values are in units of 10^6 $kgm^{-2}s^{-1}$.

Area	Core	Chirp	Ground truth mean	Range
DT	147	2.61-2.79	2.66	2.54-2.70
DT	205	2.78	2.64	2.43-2.74
DT	207	2.78	2.69	2.57-2.85
DT	226	2.97	2.82	2.76-2.95
DT	232	3.01	3.18	3.14-3.21
LTB	LTB1	3.01-3.28	3.28	2.86-3.47
LTB	LTB2	3.28-3.63	3.41	3.19-3.54

SECTION VI. CONCLUSIONS

- The study sites show marked differences in their respective geologic and corresponding geophysical/acoustic frameworks. These differences are well-defined by the various tools used in this investigation, and particularly by the remote acoustic instruments.

- Comparison of mineralogic, petrologic, and geoacoustic parameters of the sediments indicates that porosity and mineralogy both contribute significantly to the acoustic impedance of sediments and result in two separate impedance fields for carbonate sediments and mixed carbonate-siliciclastic sediments (Fig. 49a). Our data show a moderate positive correlation between % silt and impedance, but no correlation between mean grain size and impedance, perhaps because of complex variations in the ratio of interparticle to intraparticle porosity resulting from diagenesis of the carbonate sediments. More work needs to be performed to define the role of fabric in determining acoustic impedance. The percent carbonate versus siliciclastics contributes to the bulk density of the sediments and results in siliciclastic-rich sediments having a lower bulk density than carbonate sediments, for a given impedance value. These data will facilitate the refinement of sediment classification algorithms for use with the chirp sonar.

- Surficial sediment reflection coefficient values obtained by the chirp vertical beam sonar appear to record an impedance value similar, but not identical, to impedance measured on cores (Table 2). These data will enable calibration of the chirp sonar and indicate the potential of chirp vertical beam sonar for surface and subsurface sediment classification by impedance inversion.

- The study areas have been investigated and defined in terms of the physical and acoustic properties of the sediments and rocks, and the general geology and geomorphology. These sites are now suitable as AUV test beds. The data acquired by

towed vehicles (chirp sonar, side-scan sonar, seismic) using differential GPS provide a geologic, geographic and geoacoustic baseline which we are prepared to use for Autonomous Underwater Vehicle testing and calibration, the primary focus of our current research. We are preparing a joint USF-FAU expedition to test the Ocean Voyager II AUV with a 60 kHz side scan sonar unit. Tests are being planned for AUV deployment in the Boca Raton and Indian Rocks Beach sites. Deployment in these areas will allow us to evaluate navigation modes, and the quality of AUV-acquired data as compared to data acquired by towed platforms. We anticipate performance of these experiments in the Fall of 1996 or Spring of 1997.

- Comparison of geologic and acoustic data is hindered sometimes by difficulties in obtaining accurate velocity measurements on very coarse sedimentary units. However, given sufficient data, forward modeling reveals some agreement between sediment physical properties, acoustic properties measured by the electric logger, and the chirp sonar data. These data illustrate the need for high resolution sampling and analyses of sediments to accurately model the acoustic signature and refine acoustic sediment classification algorithms. The data also reveal the potential for chirp sonar to resolve shallow subbottom sedimentary units with minimal impedance contrast on a decimeter scale.

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APPENDIX A.

Condensed data from all sites.

Abbreviations:

DT = Dry Tortugas
BOCA = Boca Raton
IRB = Indian Rocks Beach
LTB = Lower Tampa Bay
%I.R. = % insoluble residue (dominantly quartz)
%carb = wt.% carbonate (acid-soluble component)
arag = aragonite
lmc = low-Mg calcite
hmc = high-Mg calcite
dolo = dolomite
impedance = 10^6 $kgm^{-2}s^{-1}$

SITE	CORE	DEPTH	% gravel	% sand	% silt	% clay	mean	mean	% I.R.	% carb	% arag	% lmc	% hmc	% dolo	velocity	density	%porosity	impedance
		(cm)					(microns)	(phi)							m/s	g/cm3		10^6 kg/m^2 s
DT	205	0	0.2	25.3	56.0	18.6	15.3	6.0	3.7	96.3	50.4	13.1	32.8	0.0	1495.3	1.63	67.00	2.43
DT	205	2	0.2	33.4	53.0	13.4	28.2	5.2							1502.0	1.71	62.68	2.56
DT	205	4	0.5	23.8	61.2	14.5	22.4	5.5							1469.5	1.75	60.04	2.58
DT	205	6	0.7	30.8	55.4	13.2	30.1	5.1							1456.2	1.78	58.68	2.59
DT	205	8	1.3	28.7	53.3	16.7	19.5	5.7								1.82	56.59	
DT	205	10	0.8	28.0	54.8	16.4	19.0	5.7	3.6	96.4	49.6	14.3	32.4	0.0	1460.6	1.83	55.73	2.68
DT	205	12	0.7	30.8	52.2	16.4	20.8	5.6							1460.6	1.86	54.01	2.72
DT	205	14	1.7	36.3	47.6	14.4	29.5	5.1							1457.2	1.83	55.91	2.67
DT	205	16	1.3	36.6	46.3	15.8	24.4	5.4							1461.2	1.86	54.30	2.72
DT	205	18	3.5	37.8	44.8	13.8	33.7	4.9							1458.5	1.88	53.17	2.74
DT	205	20	1.4	41.6	43.2	13.7	34.2	4.9	3.8	96.2	50.6	14.0	31.7	0.0	1457.2	1.88	53.09	2.74
DT	205	22	1.0	42.4	42.9	13.7	33.3	4.9							1469.1	1.89	52.37	2.78
DT	205	24	2.0	43.2	39.9	14.9	31.4	5.0							1498.8	1.89	52.50	2.83
DT	205	26	1.6	45.0	40.0	13.3	37.8	4.7							1472.9	1.90	52.24	2.79
DT	205	28	3.7	45.5	39.1	11.7	44.7	4.5							1470.2	1.89	52.63	2.78
DT	205	30	1.2	45.5	38.8	14.4	34.7	4.8	3.3	96.7	51.2	13.6	31.5	0.0	1476.9	1.91	51.59	2.82
DT	205	32	3.5	44.8	39.5	12.2	42.3	4.6							1479.5	1.91	51.27	2.83
DT	205	34	6.3	50.7	31.3	11.8	63.0	4.0							1476.9	1.90	52.10	2.80
DT	205	36	1.6	48.6	37.7	12.0	45.9	4.4							1471.5	1.90	51.92	2.80
DT	205	38	1.7	50.0	35.0	13.3	40.7	4.6							1479.5	1.92	50.91	2.84
DT	205	40	1.2	49.5	36.5	12.7	43.3	4.5	3.2	96.8	50.9	13.5	32.0	0.0	1474.2	1.93	50.45	2.84
DT	205	42	1.4	41.3	42.2	15.1	29.0	5.1							1490.4	1.93	50.53	2.87
DT	205	44	1.2	48.5	36.9	13.4	39.4	4.7							1487.6	1.93	50.35	2.87
DT	205	46	2.2	50.7	35.3	11.7	48.7	4.4							1490.4	1.93	50.16	2.88
DT	205	48	2.4	46.3	37.2	14.1	37.8	4.7							1494.4	1.94	49.90	2.90
DT	205	50	2.3	49.9	34.5	13.3	41.8	4.6	2.2	97.8	51.3	15.0	29.6	0.3	1494.4	1.91	51.72	2.85
DT	205	52	2.6	50.6	35.4	11.4	51.6	4.3							1494.4	1.92	50.89	2.87
DT	205	54	3.6	49.9	31.8	14.7	37.9	4.7							1495.8	1.94	50.11	2.89
DT	205	56	1.5	51.7	34.4	12.4	46.1	4.4							1494.4	1.93	50.30	2.89
DT	205	58	1.4	48.9	36.1	13.6	38.9	4.7								1.93	50.63	
DT	205	60	3.6	48.3	35.1	13.1	45.2	4.5	2.5	97.5	54.3	12.6	29.4	0.0	1474.2	1.91	51.71	2.81
DT	205	62	2.5	44.5	38.4	14.6	34.1	4.9								1.92	51.01	
DT	205	64	2.8	50.1	34.7	12.4	44.9	4.5								1.88	53.13	
DT	205	66	2.3	50.3	35.6	11.8	46.6	4.4								1.90	52.27	
DT	205	68	1.5	46.5	39.1	12.8	38.6	4.7								1.93	50.65	
DT	205	70	1.6	47.0	37.9	13.6	38.7	4.7	2.0	98.0	51.5	13.9	30.5	0.4	1481.6	1.92	50.92	2.85
DT	205	72	4.4	44.3	36.7	14.6	36.0	4.8							1479.7	1.90	51.83	2.82
DT	205	74	3.2	47.0	36.1	13.6	40.0	4.6							1483.7	1.90	52.20	2.81
DT	205	76	3.4	47.0	36.0	13.7	40.0	4.6							1481.0	1.92	51.16	2.84
DT	205	78	7.5	45.3	33.5	13.6	48.5	4.4							1481.7	1.91	51.59	2.83
DT	205	80	3.1	51.1	32.8	13.0	47.2	4.4	2.7	97.3	54.4	12.8	29.1	0.0	1487.7	1.91	51.64	2.84
DT	205	82	3.9	49.3	31.8	14.9	44.5	4.5							1492.0	1.92	50.91	2.87

SITE	CORE	DEPTH	% gravel	% sand	% silt	% clay	mean	mean	% I.R.	% carb	% arag	% lmc	% hmc	% dolo	velocity	density	%porosity	impedance
		(cm)					(microns)	(phi)							m/s	g/cm3		10^6 kg/m^2 s
DT	205	84	3.4	46.6	36.0	14.1	37.4	4.7							1496.0	1.90	52.00	2.84
DT	205	86	7.0	41.8	36.6	14.6	42.7	4.6							1485.4	1.90	52.24	2.82
DT	205	88	3.4	49.2	33.8	13.7	45.1	4.5								1.91	51.58	
DT	205	90	4.4	50.9	32.7	12.1	54.7	4.2	3.2	96.8	52.0	13.5	30.4	0.3		1.88	53.21	
DT	205	92	2.7	47.9	35.8	13.6	39.9	4.6								1.91	51.35	
DT	205	94	2.7	48.4	35.3	13.5	40.3	4.6							1547.1	1.92	50.79	2.97
DT	205	96	3.0	48.3	33.0	15.7	33.0	4.9								1.91	51.63	
DT	205	98	8.5	47.3	31.3	12.9	61.8	4.0								1.96	48.73	
DT	205	100							2.5	97.5	51.6	13.8	30.9	0.0		1.97	48.20	
DT	205	102														2.00	46.69	
DT	205	104														1.97	47.99	
DT	205	106														2.00	46.71	
DT	205	108														1.99	47.15	
DT	205	110	8.5	49.5	28.8	13.2	61.9	4.0	2.6	97.4	54.7	12.9	28.7	0.0		1.27	86.64	
DT	207	0							3.7	96.3	54.5	16.0	29.6	0.0			165.37	
DT	207	2													1567.4		113.19	0.00
DT	207	4															134.15	
DT	207	6														1.37	80.99	
DT	207	8														1.47	75.68	
DT	207	10	0.0	17.6	62.6	22.1	11.7	6.4	3.7	96.3	53.4	16.6	30.0	0.0	1490.5	1.72	61.74	2.57
DT	207	12	0.0	21.4	62.2	19.0	16.0	6.0							1486.4	1.75	60.36	2.60
DT	207	14	0.1	21.3	58.3	21.1	12.1	6.4								1.79	58.13	
DT	207	16	0.1	24.5	56.0	21.5	13.0	6.3								1.82	56.29	
DT	207	18	0.0	19.4	58.3	23.7	11.3	6.5							1513.3	1.82	56.22	2.76
DT	207	20	1.1	18.7	59.5	23.8	11.9	6.4	3.7	96.3	54.5	15.9	29.6	0.0	1508.1	1.89	52.43	2.85
DT	207	22	0.2	29.6	52.6	19.9	16.2	5.9							1508.2	1.86	54.18	2.81
DT	207	24	6.9	22.0	47.7	24.6	11.6	6.4							1490.8	1.84	55.28	2.74
DT	207	26	0.6	24.1	54.6	23.1	12.8	6.3							1468.8	1.87	53.45	2.75
DT	207	28	5.0	29.5	49.6	18.6	20.6	5.6							1469.2	1.87	53.86	2.74
DT	207	30	1.5	23.7	51.3	24.6	10.4	6.6	3.4	96.6	53.0	15.2	30.9	0.9	1455.0	1.83	55.72	2.67
DT	207	32	1.0	25.0	50.6	23.9	11.3	6.5								1.88	53.30	
DT	207	34	1.5	25.0	47.4	28.6	10.1	6.6								1.88	53.24	
DT	207	36	0.7	25.7	53.8	22.9	13.7	6.2								1.91	51.45	
DT	207	38	4.8	23.7	49.2	25.7	12.3	6.3							1468.2	1.88	52.87	2.77
DT	207	40	1.6	33.8	45.5	20.9	16.3	5.9	3.3	96.7	55.3	14.9	29.8	0.0	1468.2	1.88	52.90	2.77
DT	207	42	0.6	28.1	44.0	28.3	9.2	6.8								1.88	52.93	
DT	207	44	1.7	28.1	45.2	28.8	10.4	6.6								1.89	52.49	
DT	207	46	0.6	28.4	51.5	22.6	14.4	6.1							1511.6	1.90	52.29	2.86
DT	207	48	0.9	32.2	51.5	16.6	21.6	5.5							1462.5	1.91	51.46	2.79
DT	207	50	0.8	29.2	51.2	21.0	15.3	6.0	3.3	96.7	55.9	15.8	28.3	0.0		1.90	51.95	

SITE	CORE	DEPTH	% gravel	% sand	% silt	% clay	mean	mean	% I.R.	% carb	% arag	% lmc	% hmc	% dolo	velocity	density	%porosity	impedance
		(cm)					(microns)	(phi)							m/s	g/cm3		10^6 kg/m^2 s
DT	207	52	0.4	29.3	49.5	22.0	13.5	6.2								1.91	51.62	
DT	207	54	0.5	32.6	49.7	20.9	18.1	5.8							1462.8	1.96	48.82	2.86
DT	207	56	0.2	31.6	47.3	23.0	13.6	6.2							1461.6	1.92	50.72	2.81
DT	207	58	0.8	28.0	48.1	24.9	10.9	6.5							1463.7	1.92	51.10	2.81
DT	207	60	1.1	30.8	46.3	24.1	12.9	6.3	3.2	96.8	53.7	17.9	28.5	0.0	1459.7	1.93	50.32	2.82
DT	207	62	1.1	34.9	46.2	20.1	18.4	5.8							1506.2	1.88	53.03	2.83
DT	207	64	0.6	36.1	40.1	25.4	13.3	6.2							1461.7	1.88	53.02	2.75
DT	207	66	0.9	31.5	47.8	20.8	14.4	6.1							1459.1	1.93	50.59	2.81
DT	207	68	1.0	28.9	48.9	23.0	13.6	6.2							1464.3	1.91	51.58	2.79
DT	207	70	0.4	23.9	54.0	23.7	12.3	6.3	3.0	97.0	56.0	17.1	26.9	0.0	1459.1	1.95	49.27	2.85
DT	207	72	1.1	25.1	50.7	25.8	13.0	6.3								1.94	49.60	
DT	207	74	0.2	19.0	67.7	16.1	20.1	5.6								1.93	50.38	
DT	207	76	0.4	34.6	43.3	23.1	13.7	6.2							1475.7	1.93	50.39	2.85
DT	207	78	0.7	25.7	51.2	25.0	12.4	6.3								1.96	48.63	
DT	207	80	0.4	27.1	49.7	25.7	12.6	6.3	3.1	96.9	55.6	16.8	26.9	0.8		1.95	49.55	
DT	207	82	0.6	27.9	47.0	25.9	11.6	6.4								1.95	49.52	
DT	207	84	0.4	26.8	48.5	26.6	11.8	6.4							1467.6	1.93	50.49	2.83
DT	207	86	0.5	25.7	49.7	26.1	11.8	6.4							1467.6	1.94	50.11	2.84
DT	207	88	0.6	26.9	50.0	25.0	12.6	6.3							1465.0	1.95	49.50	2.85
DT	207	90	1.4	27.5	48.3	24.5	12.5	6.3			57.0	15.5	27.6	0.0	1468.1	1.94	49.82	2.85
DT	207	92	1.3	32.4	44.6	23.5	14.0	6.2								1.96	48.92	
DT	207	94	0.7	29.2	49.2	24.7	13.9	6.2								1.94	49.59	
DT	207	96	1.5	29.6	47.9	23.8	14.1	6.1							1470.3	1.93	50.47	2.84
DT	207	98	1.9	27.2	50.3	23.1	14.4	6.1								1.93	50.49	
DT	207	100	2.0	35.7	39.0	26.3	14.0	6.2			57.4	15.7	26.4	0.5		1.92	51.01	
DT	207	102	1.2	33.1	48.1	18.7	17.6	5.8								1.95	49.14	
DT	207	104	2.3	33.6	43.8	22.6	15.8	6.0								1.88	53.06	
DT	207	106	1.7	32.6	44.7	23.7	14.5	6.1							1489.8	1.96	48.81	2.92
DT	207	108	1.8	37.9	42.7	20.0	21.5	5.5								1.91	51.62	
DT	207	110	3.3	32.8	43.4	22.1	17.2	5.9			58.9	14.5	26.6	0.0		1.94	49.75	
DT	207	112	1.7	25.3	48.4	26.4	11.7	6.4								1.96	48.90	
DT	207	114	1.2	29.8	47.4	23.8	13.8	6.2								1.97	48.46	
DT	207	116	1.5	28.8	47.3	23.5	13.3	6.2								1.97	48.26	
DT	207	118	2.7	28.1	46.3	26.3	13.5	6.2							1474.2	2.00	46.76	2.94
DT	207	120	3.6	36.7	41.4	20.7	21.0	5.6			58.6	16.7	24.2	0.5	1478.6	2.00	46.37	2.96
DT	207	122	2.1	35.7	42.4	22.4	17.0	5.9							1473.4	2.00	46.64	2.94
DT	207	124	2.3	36.9	40.3	22.1	17.9	5.8							1483.0	2.01	45.75	2.99
DT	207	126	1.6	29.9	45.6	25.6	13.2	6.2							1484.0	2.00	46.74	2.96
DT	207	128	1.7	32.7	46.4	23.2	16.5	5.9							1483.0	2.01	46.17	2.98
DT	207	130	2.4	38.1	42.0	21.0	22.7	5.5			53.5	19.4	27.0	0.0	1487.4	2.01	45.80	3.00
DT	207	132	4.2	34.5	39.9	23.3	17.6	5.8							1486.1	2.03	44.78	3.02
DT	207	134	5.9	34.9	42.0	20.1	25.2	5.3							1487.6	2.03	44.91	3.02

SITE	CORE	DEPTH	% gravel	% sand	% silt	% clay	mean	mean	% I.R.	% carb	% arag	% lmc	% hmc	% dolo	velocity	density	%porosity	impedance
		(cm)					(microns)	(phi)							m/s	g/cm3		10^6 kg/m^2 s
DT	207	136	3.0	38.3	38.4	22.4	18.4	5.8							1485.8	2.02	45.53	3.00
DT	207	138	5.9	37.5	39.0	20.1	26.2	5.3							1486.0	2.01	46.19	2.98
DT	207	140	8.6	41.3	32.0	19.5	36.4	4.8			58.9	15.7	25.4	0.0		2.02	45.59	
DT	207	142	3.9	37.7	38.5	22.1	20.1	5.6							1479.2	1.98	47.69	2.93
DT	207	144	4.0	33.4	42.4	23.9	17.5	5.8							1484.6	1.99	46.98	2.96
DT	207	146	4.6	33.0	41.2	23.6	16.8	5.9								2.05	44.07	
DT	207	148	3.5	34.8	41.8	22.9	19.1	5.7								2.03	45.11	
DT	207	150	4.1	41.7	33.5	21.8	21.9	5.5			59.2	14.5	26.2	0.0	1484.8	2.03	45.18	3.01
DT	207	152	4.7	42.8	33.6	21.6	26.7	5.2								2.05	43.92	
DT	207	154	3.8	41.7	33.2	22.7	20.3	5.6							1488.1	2.02	45.61	3.00
DT	207	156	7.0	30.6	39.3	25.7	16.7	5.9							1486.9	2.00	46.34	2.98
DT	207	158	10.6	37.0	33.9	20.5	37.7	4.7								2.02	45.35	
DT	207	160	5.3	38.7	37.2	22.3	27.7	5.2			58.7	15.3	26.0	0.0	1489.6	2.02	45.34	3.01
DT	207	162	5.7	43.7	33.4	18.8	36.2	4.8							1485.5	2.04	44.55	3.03
DT	207	164	5.3	43.3	32.6	20.6	30.7	5.0								2.03	44.82	
DT	207	166	7.5	44.4	30.5	19.3	40.5	4.6								2.02	45.28	
DT	207	168	6.6	45.0	30.9	19.3	39.6	4.7								2.01	45.82	
DT	207	170	9.7	38.7	33.8	19.8	43.0	4.5			59.7	14.0	25.9	0.4		2.01	46.21	
DT	207	172	7.4	42.1	32.5	19.5	39.4	4.7							1489.6	2.02	45.50	3.01
DT	207	174	11.5	40.8	28.7	20.1	45.4	4.5								2.08	42.17	
DT	207	176	11.2	43.3	30.2	16.7	65.5	3.9			61.6	13.4	25.0	0.0		2.06	43.04	
DT	209	0	16.0	14.8	59.1	10.2	78.9	3.7			50.4	16.0	32.9	0.8		1.62	67.61	
DT	209	2	5.4	14.1	66.0	14.5	18.8	5.7								1.76	59.44	
DT	209	4	0.1	14.1	74.0	11.8	20.8	5.6							1496.8	1.82	56.32	2.73
DT	209	6	0.1	13.3	73.9	12.6	19.7	5.7							1511.4	1.81	57.20	2.73
DT	209	8	0.3	12.5	74.1	13.1	18.4	5.8							1512.8	1.80	57.30	2.73
DT	209	10	0.1	11.9	72.6	15.5	14.8	6.1			52.5	14.1	33.0	0.4	1512.8	1.81	57.10	2.73
DT	209	12	0.4	15.6	67.8	16.2	14.6	6.1							1458.3	1.88	53.35	2.74
DT	209	14	0.7	15.8	66.8	16.7	14.3	6.1							1507.2	1.86	53.98	2.81
DT	209	16	1.1	16.8	66.8	15.3	16.7	5.9							1454.9	1.89	52.66	2.75
DT	209	18	0.3	15.2	62.9	21.5	10.4	6.6							1459.0	1.88	52.88	2.75
DT	209	20	1.1	18.4	62.5	18.0	13.9	6.2			51.6	14.7	32.6	1.1	1461.6	1.92	51.09	2.80
DT	209	22	0.0	0.0	61.9	18.4									1462.9	1.92	51.09	2.80
DT	209	24	0.5	22.0	59.7	17.7	15.4	6.0							1510.4	1.88	53.26	2.84
DT	209	26	0.7	21.5	59.8	18.0	14.8	6.1							1461.6	1.88	52.88	2.75
DT	209	28	0.0	0.0	61.4	17.5									1459.0	1.90	52.00	2.77
DT	209	30	0.0	0.0	60.3	18.2					50.8	14.1	34.8	0.2	1456.4	1.90	52.25	2.76
DT	209	32	0.6	20.9	60.3	18.2	14.7	6.1							1459.0	1.92	50.70	2.81
DT	209	34	1.1	20.7	60.6	17.6	15.4	6.0							1462.9	1.93	50.26	2.83
DT	209	36	0.5	23.1	60.5	15.9	18.4	5.8							1464.3	1.94	50.07	2.83

SITE	CORE	DEPTH	% gravel	% sand	% silt	% clay	mean	mean	% I.R.	% carb	% arag	% lmc	% hmc	% dolo	velocity	density	%porosity	impedance
		(cm)					(microns)	(phi)							m/s	g/cm3		10^6 kg/m^2 s
DT	209	38	0.7	21.1	60.9	17.4	15.9	6.0							1465.6	1.92	50.97	2.81
DT	209	40	1.4	26.0	57.6	15.0	21.3	5.6			54.0	13.6	32.3	0.0	1470.9	1.96	48.60	2.89
DT	209	42	0.6	21.3	59.7	18.5	14.4	6.1							1466.9	1.96	48.51	2.88
DT	209	44	0.3	24.8	60.0	14.8	21.1	5.6							1468.2	1.97	48.38	2.89
DT	209	46	0.5	22.0	60.0	17.5	15.4	6.0							1466.9	1.94	50.01	2.84
DT	209	48	0.7	25.2	56.9	17.1	16.6	5.9							1465.6	1.93	50.37	2.83
DT	209	50	0.7	27.2	56.6	15.6	20.0	5.6			52.4	14.8	32.2	0.7	1465.6	1.95	49.16	2.86
DT	209	52	0.3	25.5	58.6	15.7	18.8	5.7							1465.6	1.97	48.36	2.88
DT	209	54	0.6	30.7	55.2	13.5	23.3	5.4							1461.6	1.93	50.62	2.81
DT	209	56	0.5	30.8	53.5	15.2	21.7	5.5							1465.6	1.95	49.53	2.85
DT	209	58	0.2	28.6	54.2	16.9	18.1	5.8							1457.4	1.93	50.33	2.81
DT	209	60	0.4	26.1	54.6	19.0	14.4	6.1			52.6	16.7	30.7	0.0	1462.8	1.95	49.23	2.85
DT	209	62	0.4	24.1	61.1	14.3	20.2	5.6							1464.1	1.97	48.27	2.88
DT	209	64	0.4	28.6	58.9	12.0	23.2	5.4							1462.8	1.93	50.13	2.83
DT	209	66	0.0	0.0	79.7	20.3									1510.2	1.92	51.08	2.90
DT	209	68	0.6	26.2	55.4	17.9	16.1	6.0							1461.6	1.93	50.38	2.82
DT	209	70	0.9	27.5	57.1	14.5	21.9	5.5			49.2	17.0	32.9	0.9	1460.3	1.94	49.92	2.83
DT	209	72	1.2	24.4	55.2	19.2	14.3	6.1							1461.6	1.94	50.08	2.83
DT	209	74	1.5	24.5	54.3	19.6	14.9	6.1							1460.3	1.94	49.76	2.83
DT	209	76	0.5	25.4	53.8	20.3	13.6	6.2							1461.8	1.94	49.99	2.83
DT	209	78	1.5	27.7	52.3	18.6	16.1	6.0							1460.7	1.94	49.66	2.84
DT	209	80	1.9	28.0	52.9	17.2	18.2	5.8			54.6	13.6	31.8	0.0	1460.7	1.94	50.08	2.83
DT	209	82	1.3	26.6	53.9	18.2	15.8	6.0							1463.5	1.95	49.05	2.86
DT	209	84	0.9	27.5	52.8	18.7	16.2	5.9							1465.6	1.96	48.80	2.87
DT	209	86	1.0	26.0	55.4	17.5	17.2	5.9							1468.1	1.95	49.17	2.87
DT	209	88	4.8	26.2	52.4	16.6	19.8	5.7								1.91	51.22	
DT	209	90	2.5	27.4	54.6	15.5	20.8	5.6			53.0	15.4	31.5	0.0		1.92	50.69	
DT	209	92	1.7	30.6	51.5	16.2	20.0	5.6							1492.9	1.94	50.01	2.89
DT	226	0	0.5	33.8	51.6	14.1	28.6	5.1	3.5	96.5	51.5	14.2	34.3	0.0	1497.1	1.84	55.24	2.76
DT	226	2	0.1	33.9	50.2	15.8	23.7	5.4	4.7	95.3	51.5	15.5	33.0	0.0	1504.7	1.86	54.32	2.80
DT	226	4	1.3	30.4	53.5	14.8	26.2	5.3	2.1	97.9	51.2	20.6	28.3	0.0	1498.4	1.87	53.52	2.81
DT	226	6	1.4	33.1	51.8	13.7	29.3	5.1	7.3	92.7	51.6	16.5	32.0	0.0	1495.2	1.87	53.86	2.79
DT	226	8	1.3	31.2	52.1	15.4	25.1	5.3	3.3	96.7	52.3	15.8	31.9	0.0	1565.9	1.89	52.84	2.95
DT	226	10	0.9	31.5	49.0	18.7	17.6	5.8	3.7	96.3	48.6	17.9	33.5	0.0	1499.9	1.87	53.67	2.80
DT	226	12	0.9	34.5	48.9	15.7	24.8	5.3	3.1	96.9	49.0	18.6	32.3	0.0	1495.3	1.85	54.80	2.77
DT	226	14	1.2	31.3	49.8	17.8	19.8	5.7	3.6	96.4	47.4	18.7	33.6	0.3	1501.6	1.89	52.74	2.83
DT	226	16	3.6	35.1	45.2	16.1	25.9	5.3			46.0	22.7	31.3	0.0	1493.8	1.88	53.16	2.81
DT	226	18	0.9	34.1	48.7	16.2	23.6	5.4			53.6	17.2	28.5	0.6	1496.4	1.88	52.98	2.82
DT	226	20	1.7	35.7	46.3	16.4	24.3	5.4			52.9	15.5	31.3	0.3	1501.7	1.91	51.69	2.86
DT	226	22	1.3	37.0	45.4	16.2	24.7	5.3			51.4	21.1	27.6	0.0	1509.2	1.91	51.71	2.88

SITE	CORE	DEPTH	% gravel	% sand	% silt	% clay	mean	mean	% I.R.	% carb	% arag	% lmc	% hmc	% dolo	velocity	density	%porosity	impedance
		(cm)					(microns)	(phi)							m/s	g/cm3		10^6 kg/m^2 s
DT	226	24	1.9	35.5	45.6	17.0	23.1	5.4			52.6	17.9	29.5	0.0	1505.3	1.89	52.43	2.85
DT	226	26	1.3	38.8	43.1	16.8	24.2	5.4			53.7	16.8	29.2	0.3	1506.6	1.91	51.26	2.88
DT	226	28	4.7	38.9	40.9	15.5	31.0	5.0			48.7	21.8	29.5	0.0	1514.1	1.92	50.93	2.91
DT	226	30	1.4	43.7	40.8	14.1	35.8	4.8			51.9	15.6	32.1	0.4	1513.3	1.93	50.55	2.92
DT	226	32	1.6	41.6	41.6	15.2	30.9	5.0			52.7	22.7	24.6	0.0	1512.6	1.91	51.28	2.89
DT	226	34	2.5	42.4	40.5	14.6	34.1	4.9			52.8	15.0	31.9	0.2	1517.1	1.94	49.83	2.94
DT	226	36	2.6	45.7	37.8	13.9	39.5	4.7			50.7	16.1	33.0	0.2	1519.6	1.95	49.02	2.97
DT	226	38	3.2	42.6	39.8	14.4	35.6	4.8			51.2	16.8	31.9	0.1	1511.5	1.94	49.78	2.93
DT	226	40	1.4	46.0	39.4	13.1	40.3	4.6			49.6	26.5	23.9	0.0	1509.7	1.92	51.12	2.89
DT	226	42	2.4	46.1	38.4	13.1	42.7	4.5			48.5	17.7	33.5	0.2	1518.4	1.94	49.63	2.95
DT	226	44	1.8	45.2	38.2	14.8	34.4	4.9			53.8	16.1	29.8	0.3	1530.8	1.98	47.71	3.03
DT	226	46	3.9	41.9	39.1	15.0	33.7	4.9			52.2	15.5	31.9	0.3	1506.7	1.91	51.23	2.88
DT	226	48	2.3	40.7	41.1	15.9	28.9	5.1			48.6	17.5	33.9	0.0	1507.3	1.91	51.48	2.88
DT	226	50	2.3	46.0	37.2	14.3	37.4	4.7			49.6	14.9	35.5	0.0	1514.9	1.94	49.88	2.94
DT	226	52	2.5	45.1	38.1	14.4	37.5	4.7			46.5	17.0	36.5	0.0	1498.0	1.92	50.87	2.88
DT	226	54	1.7	43.0	40.0	15.2	31.4	5.0			50.8	16.4	32.8	0.0	1516.2	1.93	50.41	2.93
DT	226	56	3.5	45.2	36.7	14.6	39.3	4.7			53.0	17.0	30.0	0.0	1512.4	1.96	48.63	2.97
DT	226	58	4.3	44.2	37.1	14.5	40.0	4.6			55.6	17.1	27.3	0.0	1508.8	1.95	49.29	2.94
DT	226	60	4.8	46.1	36.8	12.3	50.1	4.3			47.5	18.3	33.8	0.4	1509.2	1.96	48.75	2.96
DT	226	62	2.7	48.6	37.4	11.4	52.0	4.3			48.7	11.3	40.0	0.0		1.93	50.16	
DT	226	64	3.3	50.2	34.5	12.1	53.6	4.2			53.4	16.3	30.3	0.0		1.94	49.86	
DT	226	66	3.8	46.8	36.1	13.1	45.9	4.4			54.0	20.4	25.6	0.0		1.96	48.49	
DT	226	68	3.4	49.2	35.3	12.1	54.5	4.2			50.5	21.1	28.4	0.0		1.97	48.29	
DT	226	70	4.4	46.4	37.0	12.3	51.1	4.3			53.0	16.3	30.5	0.3		1.97	48.31	
DT	226	72	3.3	45.1	36.4	15.4	38.4	4.7			52.2	18.8	29.0	0.0		1.95	49.30	
DT	226	74	3.5	43.8	36.7	16.0	32.8	4.9			55.9	17.1	27.0	0.0		1.96	48.60	
DT	226	76	2.4	47.3	34.7	15.6	36.5	4.8			50.5	16.8	32.5	0.2		1.96	48.98	
DT	226	78	7.6	46.1	32.9	13.4	56.5	4.1			53.7	15.1	31.2	0.0		1.93	50.51	
DT	226	80	4.5	44.3	35.0	16.3	35.0	4.8			51.2	18.6	29.7	0.4	1520.0	1.96	48.71	2.98
DT	226	82	3.9	45.2	34.3	16.7	34.4	4.9			53.5	17.3	29.0	0.2		1.90	52.10	
DT	226	84	6.2	45.0	34.3	14.5	46.2	4.4			51.5	17.5	30.7	0.3		1.97	48.27	
DT	226	86	3.8	44.5	35.7	15.9	34.9	4.8			52.7	17.3	29.8	0.2		1.98	47.63	
DT	226	88	4.1	45.7	34.5	15.8	38.6	4.7			51.7	16.2	32.1	0.0			150.59	
DT	226	90	3.8	48.2	34.3	13.8	47.6	4.4			51.5	16.6	31.6	0.3		1.92	50.71	
DT	226	92	2.1	48.4	34.2	15.4	38.2	4.7			54.6	17.6	27.8	0.0		1.67	64.49	
DT	226	94	4.0	46.5	33.2	16.3	37.5	4.7			55.8	16.4	27.8	0.0		1.97	48.06	
DT	226	96	4.1	46.9	34.9	14.1	46.6	4.4			49.9	17.6	32.5	0.0	1530.5	1.98	47.57	3.03
DT	226	98	4.4	42.9	35.8	17.0	33.1	4.9			49.2	16.3	34.5	0.0	1520.2	2.00	46.44	3.04
DT	226	100	6.3	45.2	33.6	14.9	45.0	4.5			52.6	17.3	29.8	0.3	1521.4	2.02	45.32	3.08
DT	226	102	7.0	45.3	32.7	15.0	48.8	4.4			52.9	16.5	30.6	0.0	1512.6	2.01	46.06	3.04
DT	226	104	10.8	45.2	28.7	15.3	64.9	3.9			51.1	17.8	31.2	0.0	1511.5	2.03	45.12	3.06
DT	226	106	8.7	43.2	32.6	15.5	51.7	4.3			52.3	17.4	30.4	0.0	1514.8	2.02	45.68	3.05

SITE	CORE	DEPTH	% gravel	% sand	% silt	% clay	mean	mean	% I.R.	% carb	% arag	% lmc	% hmc	% dolo	velocity	density	%porosity	impedance
		(cm)					(microns)	(phi)							m/s	g/cm3		10^6 kg/m^2 s
DT	232	12	1.6	39.2	49.0	10.3	44.7	4.5							1497.0	2.10	41.24	3.14
DT	232	14	1.7	40.3	48.8	9.2	49.3	4.3							1497.0	2.11	40.48	3.16
DT	232	16	1.8	41.5	46.9	9.8	49.6	4.3							1501.5	2.12	39.84	3.19
DT	232	18	1.0	42.4	43.2	13.4	32.4	4.9							1506.1	2.13	39.49	3.21
DT	232	20	2.5	43.0	43.2	11.4	42.3	4.6			50.6	15.5	33.5	0.4	1505.9	2.13	39.36	3.21
DT	232	22	2.0	41.6	39.6	16.8	23.7	5.4							1505.9	2.14	38.75	3.23
DT	232	24	3.2	41.1	41.1	14.7	30.8	5.0							1504.8	2.13	39.35	3.21
DT	232	26	2.6	44.6	39.7	13.2	37.5	4.7							1509.4	2.13	39.64	3.21
DT	232	28	4.6	48.2	35.5	11.6	56.2	4.2							1501.9	2.10	41.11	3.15
DT	232	30	1.8	49.5	36.6	12.1	44.3	4.5			48.2	18.5	33.3	0.0	1505.0	2.10	40.86	3.17
DT	232	32	2.2	41.2	40.1	16.5	26.7	5.2							1501.5	2.12	39.78	3.19
DT	232	34	2.5	52.5	34.7	10.3	57.2	4.1							1498.3	2.09	41.50	3.13
DT	232	36	3.2	48.5	36.0	12.3	47.2	4.4							1506.8	2.13	39.19	3.22
DT	232	38	3.1	54.8	32.8	9.4	68.4	3.9							1517.3	2.17	37.15	3.30
DT	232	40	2.3	50.4	36.4	10.9	50.6	4.3			53.7	15.5	30.8	0.0	1510.7	2.13	39.17	3.22
DT	232	42	3.5	51.7	34.4	10.4	60.1	4.1							1520.0	2.18	36.58	3.32
DT	232	44	2.1	48.2	37.3	12.4	43.1	4.5							1513.8	2.16	37.74	3.27
DT	232	46	8.2	48.2	32.9	10.6	67.7	3.9							1510.7	2.15	38.10	3.25
DT	232	48	3.2	46.6	28.6	21.5									1507.8	2.15	38.14	3.25
DT	232	50	5.0	50.3	36.5		80.1	3.6			52.7	15.0	32.3	0.0	1507.8	2.13	39.37	3.21
DT	232	52	5.2	46.8	34.6	13.4	47.9	4.4							1509.5	2.18	36.60	3.29
DT	232	54	4.0	51.2	34.1	10.6	64.8	3.9							1506.4	2.16	37.59	3.26
DT	232	56	4.6	47.2	35.7	12.5	47.5	4.4							1508.0	2.13	39.43	3.21
DT	232	58	3.4	46.7	37.3	12.6	45.9	4.4							1498.8	2.12	40.13	3.17
DT	232	60	2.9	47.3	33.7						52.8	18.7	28.4	0.0	1507.8	2.17	37.42	3.27
DT	232	62	6.8	50.7	28.7										1510.9	2.15	38.32	3.25
DT	232	64													1614.9	2.18	36.84	3.52
DT	232	66	3.2	58.5	21.2	17.1									1512.2	2.16	37.67	3.27
DT	232	68	2.8	57.8	26.9	12.5	60.9	4.0							1511.1	2.15	38.25	3.25
DT	232	70	3.1	48.8	29.9	18.2	31.2	5.0			51.9	15.6	32.5	0.0	1508.0	2.16	37.86	3.26
DT	232	72	6.0	51.5	27.9	14.6	48.4	4.4							1506.4	2.13	39.60	3.20
DT	232	74	4.3	56.7	23.9	15.1	47.0	4.4							1509.7	2.16	37.67	3.26
DT	232	76	4.9	47.6	30.2	17.3	35.2	4.8							1509.7	2.17	37.12	3.28
DT	232	78	3.0	55.7	22.4	19.0	33.6	4.9							1514.4	2.18	36.68	3.30
DT	232	80	4.8	48.3	28.9	18.0	34.8	4.8			53.1	14.4	32.5	0.0	1506.8	2.18	36.63	3.29
DT	232	82	3.5	57.3	21.8	17.4	38.6	4.7							1516.1	2.19	36.05	3.32
DT	232	84	3.9	50.9	27.2	18.0	33.8	4.9							1514.8	2.17	37.25	3.29
DT	232	86	4.5	50.8	23.4	21.2	28.8	5.1							1518.3	2.20	35.83	3.33
DT	232	88	5.3	52.6	27.1	14.9	47.3	4.4							1522.9	2.21	34.78	3.37
DT	232	90	3.0	53.6	27.8	15.6	41.8	4.6			52.4	20.2	27.4	0.0		2.19	36.08	

SITE	CORE	DEPTH (cm)	% gravel	% sand	% silt	% clay	mean (microns)	mean (phi)	% I.R.	% carb	% arag	% lmc	% hmc	% dolo	velocity m/s	density g/cm3	%porosity	impedance 10^6 kg/m^2 s
DT	232	92	7.1	54.5	24.2	14.3	60.4	4.0								2.17	37.27	
DT	232	94	4.8	51.5	26.4	17.3	39.2	4.7								2.16	37.72	
DT	232	96	4.7	50.8	28.1	16.3	40.6	4.6								2.25	33.11	
DT	232	98	3.2	47.3	29.6	19.8	26.2	5.3								2.21	35.11	
DT	232	100	11.1	50.7	15.0	23.1	37.7	4.7			54.5	15.9	29.7	0.0			161.22	
DT	232	102	7.7	49.0	26.5	16.7	42.5	4.6								2.05	43.73	
DT	232	104	3.1	48.8	29.4	18.7	29.2	5.1								2.00	46.80	
DT	232	106	4.0	51.3	25.2	19.6	31.6	5.0							1427.8	2.17	37.15	3.10
DT	232	108	3.0	49.9	22.4	24.7	24.3	5.4								2.16	37.95	
DT	232	110	3.1	51.4	20.1	25.4	22.7	5.5			51.3	17.7	30.6	0.4	1517.6	2.23	33.93	3.39
DT	232	112	3.9	54.6	23.7	17.8	33.5	4.9							1516.0	2.26	32.31	3.43
DT	232	114	4.6	47.0	27.6	20.8	28.6	5.1							1512.7	2.23	33.86	3.38
DT	232	116	12.0	47.4	21.9	18.7	53.6	4.2							1511.3	2.25	32.96	3.40
DT	232	118	22.8	43.0	17.0	17.2	101.6	3.3							1491.8	2.21	35.30	3.29
DT	232	120	18.3	44.2	15.1	22.5	67.5	3.9			52.1	14.8	32.6	0.5	1496.5	2.22	34.24	3.33
DT	232	122	7.1	51.7	18.9	22.3	42.5	4.6								2.24	33.34	
DT	232	124	11.3	45.0	21.8	21.9	44.8	4.5							1504.4	2.26	32.38	3.40
DT	232	126	17.9	41.4	16.7	24.1	59.8	4.1							1519.9	2.28	30.96	3.47
DT	232	128	7.5	44.6	25.3	22.6	33.1	4.9								2.29	30.86	
DT	232	130	5.4	38.3	22.5	33.9	14.0	6.2			56.3	15.3	28.4	0.0	1506.8	2.24	33.46	3.37
DT	232	132	5.6	42.4	21.5	30.5	21.2	5.6							1505.4	2.23	33.73	3.36
DT	232	134	2.5	45.8	20.4	31.3	15.5	6.0							1500.8	2.30	30.07	3.45
DT	232	136													1525.7	2.29	30.84	3.49
DT	232	138														2.30	30.08	
DT	232	140	13.7	40.2	17.8	28.3	44.5	4.5			55.4	16.3	28.3	0.0	1536.3	2.33	28.36	3.58
DT	232	142	5.9	53.5	15.1	25.5	33.3	4.9							1539.5	2.33	28.35	3.59
DT	232	144													1532.1	2.32	29.28	3.55
DT	232	146													1513.8	2.30	29.95	3.49
DT	232	148													1527.3	2.31	29.53	3.53
DT	232	150									56.8	11.9	31.3	0.0		2.23	33.92	
DT	232	152									54.2	14.6	31.2	0.0		2.19	36.31	
DT	232	154														2.30	30.04	
DT	232	156														2.28	30.96	
BOCA	S INLET	0	4.8	94.2	0.8	0.0	524.9	0.9	44.3	55.7	22.7	24.4	8.6	0.0		1.94	46.27	
BOCA	S INLET	2							48.5	51.5	21.0	22.7	7.8	0.0		1.94	44.80	
BOCA	S INLET	4							33.7	66.3	29.4	28.1	8.7	0.0		1.96	44.84	
BOCA	S INLET	6							45.7	54.3	22.6	23.6	8.1	0.0		1.99	44.40	

SITE	CORE	DEPTH	% gravel	% sand	% silt	% clay	mean	mean	% I.R.	% carb	% arag	% lmc	% hmc	% dolo	velocity	density	%porosity	impedance
		(cm)					(microns)	(phi)							m/s	g/cm3		10^6 kg/m^2 s
BOCA	S INLET	8							33.5	66.5	29.2	29.8	7.5	0.0		1.97	44.74	
BOCA	S INLET	10							37.2	62.8	28.7	24.4	9.8	0.0		1.94	44.36	
BOCA	NSO1-2	0	6.0	93.7	0.0	0.0	386.9	1.4	20.6	79.4	19.6	8.4	51.4	0.0	1542.2	2.07	38.81	3.20
BOCA	NSO1-2	2	3.7	96.3	0.0	0.0	397.8	1.3	17.7	82.3	18.7	7.5	56.1	0.0	1568.7	2.08	40.20	3.26
BOCA	NSO1-2	4							15.7	84.3	19.6	6.6	58.2	0.0	1642.1	2.13	42.61	3.50
BOCA	NSO1-2	6							7.4	92.6	19.5	5.7	67.5	0.0	1646.0	2.09	42.90	3.44
BOCA	NSO1-2	8							6.2	93.8	19.1	5.6	69.1	0.0	1658.5	2.01	42.53	3.33
BOCA	NSO1-2	10							6.7	93.3	18.6	7.8	66.9	0.0	1652.3	2.09	39.94	3.45
BOCA	NSO1-2	12							8.3	91.7	21.3	8.7	61.7	0.0	1681.8	2.03	41.45	3.42
BOCA	NSO1-4	0	0.4	97.4	1.9	0.0	178.0	2.5	45.3	54.7	14.9	10.0	29.8	0.0	1544.5	2.00	43.68	3.09
BOCA	NSO1-4	2							42.0	58.0	15.0	11.3	31.8	0.0	1689.5	2.03	43.25	3.43
BOCA	NSO1-4	4							37.0	63.0	16.9	11.0	35.0	0.0	1707.5	1.99	48.45	3.40
BOCA	NSO1-4	6							34.9	65.1	16.7	9.0	39.4	0.0	1712.2	2.01	44.14	3.44
BOCA	NSO1-4	8							33.5	66.5	19.9	10.2	36.4	0.0	1711.8	1.99	41.98	3.40
BOCA	NSO1-4	10							39.0	61.0	15.0	8.9	37.1	0.0	1710.3	1.95	45.24	3.34
BOCA	NSO1-4	12							43.1	56.9	16.2	11.0	29.7	0.0	1703.2	2.01	43.79	3.42
BOCA	NSO1-4	14							43.5	56.5	14.0	10.0	32.5	0.0	1704.1			
BOCA	NSO2-4	0	0.4	97.7	0.9	0.0	336.8	1.6	42.4	57.6	21.4	19.9	16.4	0.0	1756.7	2.09	38.66	3.67
BOCA	NSO2-4	2							38.0	62.0	21.6	22.6	17.8	0.0	1745.2	2.09	36.95	3.64
BOCA	NSO2-4	4							42.5	57.5	20.6	22.8	14.1	0.0	1751.2	2.09	37.16	3.67
BOCA	NSO2-4	6							43.2	56.8	15.9	27.8	13.1	0.0	1760.3	2.11	36.67	3.71
BOCA	NSO2-4	8							41.7	58.3	21.4	22.2	14.7	0.0	1761.3	2.09	37.89	3.68
BOCA	NSO2-4	10							45.8	54.2	18.0	21.8	14.5	0.0	1765.3	2.06	38.91	3.64
BOCA	NSO2-4	12							43.3	56.7	18.2	22.2	16.3	0.0	1759.8	2.04	40.63	3.60
BOCA	NSO3-4	0	0.3	97.4	1.4	0.0	210.2	2.3	48.7	51.3	14.9	15.9	20.4	0.0				
BOCA	NSO3-4	2							51.9	48.1	15.9	15.8	16.4	0.0		2.02	41.25	
BOCA	NSO3-4	4							51.7	48.3	13.0	17.4	17.9	0.0		2.03	39.64	
BOCA	NSO3-4	6							51.1	48.9	12.9	17.7	18.3	0.0		2.07	38.91	
BOCA	NSO3-4	8							52.3	47.7	11.5	17.3	18.9	0.0				
BOCA	NSO3-4	10							52.0	48.0	14.3	17.0	16.7	0.0				
BOCA	NSO3-4	12							51.5	48.5	12.9	16.4	19.2	0.0				
BOCA	NSO3-4	14							51.2	48.8	13.5	15.0	20.3	0.0				
BOCA	NSO3-4	16							50.7	49.3	14.5	16.4	18.4	0.0				
BOCA	NSO3-4	18							50.0	50.0	14.3	14.6	21.0	0.0				
BOCA	NSO3-4	20							49.7	50.3	19.2	13.2	18.0	0.0				

SITE	CORE	DEPTH	% gravel	% sand	% silt	% clay	mean	mean	% I.R.	% carb	% arag	% lmc	% hmc	% dolo	velocity	density	%porosity	impedance
		(cm)					(microns)	(phi)							m/s	g/cm3		10^6 kg/m^2 s
BOCA	NSO4-4	0							47.9	52.1	18.2	21.1	12.8	0.0	1545.9	2.12	37.16	3.28
BOCA	NSO4-4	2							52.6	47.4	16.4	19.8	11.2	0.0	1759.2	2.14	38.49	3.76
BOCA	NSO4-4	4							47.3	52.7	20.1	20.1	12.5	0.0	1757.7	2.12	39.64	3.73
BOCA	NSO4-4	6							45.0	55.0	20.4	21.9	12.7	0.0	1764.2	2.10	38.80	3.70
BOCA	NSO4-4	8							44.6	55.4	15.4	23.0	17.0	0.0	1764.2	2.06	39.68	3.63
BOCA	NSO4-4	10	0.2	98.4	1.3	0.0	253.5	2.0	47.2	52.8	16.4	20.3	16.1	0.0	1760.7	2.08	39.33	3.66
BOCA	NSO5-1	0							47.2	52.8	17.3	22.3	13.2	0.0	1762.8	2.19	36.47	3.86
BOCA	NSO5-1	2							49.1	50.9	18.5	18.8	13.6	0.0	1750.2	2.16	35.89	3.79
BOCA	NSO5-1	4							47.0	53.0	20.4	18.8	13.7	0.0	1774.0	2.12	38.41	3.75
BOCA	NSO5-1	6							42.8	57.2	20.4	21.2	15.5	0.0	1758.7	2.20	36.03	3.87
BOCA	NSO5-1	8							41.1	58.9	19.5	22.0	17.4	0.0	1761.2	2.20	34.86	3.87
BOCA	NSO5-1	10	1.6	95.0	1.1	0.0	339.2	1.6	43.3	56.7	19.1	23.2	14.3	0.0	1770.4	2.16	35.91	3.83
BOCA	NSO5-1	12							39.0	61.0	20.3	24.1	16.6	0.0	1769.9	2.18	36.03	3.85
BOCA	NSO5-1	14							37.1	62.9	25.0	18.9	19.0	0.0	1767.3	2.12	36.52	3.75
BOCA	NSO5-1	16							37.1	62.9	20.8	23.1	19.0	0.0	1760.7	2.18	35.00	3.84
BOCA	NSO6-3	0	2.8	95.5	1.3	0.0	244.9	2.0	36.4	63.6	15.9	13.2	34.5	0.0	1548.8	2.00	45.42	3.10
BOCA	NSO6-3	2							36.7	63.3	18.1	12.4	32.8	0.0	1704.3	1.98	47.55	3.37
BOCA	NSO6-3	4							40.3	59.7	14.4	13.1	32.2	0.0	1689.8	2.00	43.68	3.38
BOCA	NSO6-3	6							38.5	61.5	14.5	12.9	34.1	0.0	1713.4			
BOCA	NSO6-3	8							38.6	61.4	15.5	12.1	33.8	0.0	1723.5	2.02	43.15	3.48
BOCA	NSO6-3	10							40.5	59.5	15.7	12.4	31.5	0.0	1715.8	2.03	43.33	3.48
BOCA	NSO6-3	12							29.7	70.3	14.7	16.0	39.6	0.0	1715.8	2.08	42.60	3.57
BOCA	NSO6-3	14							30.3	69.7	18.6	11.3	39.8	0.0	1715.3			
BOCA	NSO6-3	16							29.0	71.0	17.4	12.4	41.2	0.0	1691.7	2.03	45.02	3.43
BOCA	NSO7-3	0	0.2	99.1	1.1	0.0	238.2	2.1	53.0	47.0	15.2	17.7	14.1	0.0	1759.0	2.14	39.65	3.76
BOCA	NSO7-3	2							54.8	45.2	13.6	19.5	12.1	0.0	1762.5	2.06	40.90	3.63
BOCA	NSO7-3	4							53.4	46.6	8.3	29.5	8.8	0.0	1759.0	2.09	40.84	3.68
BOCA	NSO7-3	6							53.4	46.6	13.8	16.9	15.9	0.0	1758.5	2.12	41.39	3.73
BOCA	NSO7-3	8							53.3	46.7	20.3	14.0	12.5	0.0	1755.5	2.10	39.82	3.69
BOCA	NSO7-3	10							52.3	47.7	13.3	17.5	17.0	0.0	1759.0	2.08	40.60	3.66
BOCA	NSO7-3	12							53.7	46.3	12.9	21.0	12.5	0.0	1760.5	2.07	41.31	3.64
BOCA	NSO7-3	14							51.7	48.3	16.0	17.4	14.9	0.0	1744.0	2.09	43.02	3.64
BOCA	NSO7-3	16							51.5	48.5	14.6	18.0	15.9	0.0	1745.5	2.16	39.23	3.77
BOCA	NSO7-3	18							47.8	52.2	16.2	18.2	17.8	0.0	1754.5	2.16	38.84	3.79

SITE	CORE	DEPTH	% gravel	% sand	% silt	% clay	mean	mean	% I.R.	% carb	% arag	% lmc	% hmc	% dolo	velocity	density	%porosity	impedance
		(cm)					(microns)	(phi)							m/s	g/cm3		10^6 kg/m^2 s
IRB	IRB6-1	0	0.4	98.3	0.1	0.0	193.4	2.4							1455.4	2.02	40.38	2.95
IRB	IRB6-1	1													1725.5			
IRB	IRB6-1	2													1740.7	2.04	40.95	3.54
IRB	IRB6-1	3													1757.1			
IRB	IRB6-1	4													1760.1	2.07	39.33	3.64
IRB	IRB6-1	5													1761.2			
IRB	IRB6-1	6													1755.1	2.06	40.18	3.61
IRB	IRB6-1	7													1762.2			
IRB	IRB6-1	8													1759.1	2.05	40.34	3.60
IRB	IRB6-1	9													1746.1			
IRB	IRB6-1	10	11.7	86.6	0.0	0.0	503.5	1.0							1709.6	2.07	37.44	3.54
IRB	IRB6-1	11													1702.5			
IRB	IRB6-1	12													1694.5	1.99	42.50	3.37
IRB	IRB6-2	0	7.1	92.9	0.0	0.0	466.5	1.1	37.9	62.1					1542.2	2.05		3.16
IRB	IRB6-2	1													1773.8	2.05		3.64
IRB	IRB6-2	2	5.0	95.0	0.0	0.0	299.4	1.7	39.5	60.5					1725.2	2.05		3.54
IRB	IRB6-2	3													1710.7	2.05		3.51
IRB	IRB6-2	4	9.3	90.6	0.0	0.0	524.9	0.9	38.7	61.3					1726.1	2.05		3.54
IRB	IRB6-2	5													1746.9	2.05		3.58
IRB	IRB6-2	6	20.7	79.3	0.0	0.0	594.6	0.8	30.7	69.3					1699.7	2.05		3.48
IRB	IRB6-2	7													1681.5	2.05		3.45
IRB	IRB6-2	8	33.6	66.3	0.0	0.0	835.1	0.3	21.7	78.3					1686.1	2.05		3.46
IRB	IRB6-2	13													1659.5	2.05		3.40
IRB	IRB6-2	14													1692.6	2.05		3.47
IRB	IRB6-2	15													1721.3	2.05		3.53
IRB	IRB6-2	16													1691.2	2.05		3.47
IRB	IRB6-2	17													1681.5	2.05		3.45
IRB	IRB6-2	18													1676.8	2.05		3.44
IRB	IRB6-3	0	6.6	92.8	0.0	0.0	389.6	1.4							1543.3	2.04	41.43	3.15
IRB	IRB6-3	1													1709.9			
IRB	IRB6-3	2													1730.2	2.06	40.61	3.57
IRB	IRB6-3	3													1721.9			
IRB	IRB6-3	4													1739.5	2.09	42.05	3.64
IRB	IRB6-3	5													1739.5			
IRB	IRB6-3	6													1746.9	2.03	41.89	3.54
IRB	IRB6-3	7													1745.4			
IRB	IRB6-3	8													1734.6	2.05	41.19	3.55
IRB	IRB6-3	9													1724.3			
IRB	IRB6-3	10													1714.2	2.02	40.12	3.45

SITE	CORE	DEPTH	% gravel	% sand	% silt	% clay	mean	mean	% I.R.	% carb	% arag	% lmc	% hmc	% dolo	velocity	density	%porosity	impedance
		(cm)					(microns)	(phi)							m/s	g/cm3		10^6 kg/m^2 s
LTB	LTB1-1	0	2.8	89.2	10.8		193.4	2.4							1539.1	1.86	45.77	2.86
LTB	LTB1-1	1													1685.4			
LTB	LTB1-1	2													1691.9	2.05	42.70	3.47
LTB	LTB1-1	3													1692.4			
LTB	LTB1-1	4													1685.4	2.05	42.79	3.46
LTB	LTB1-1	5													1655.8			
LTB	LTB1-1	6													1620.7	1.92	45.26	3.11
LTB	LTB1-1	7													1697.1			
LTB	LTB1-1	8													1695.7	1.96	44.06	3.32
LTB	LTB1-1	9													1696.2			
LTB	LTB1-1	10													1708.5	1.97	44.10	3.37
LTB	LTB1-1	11													1696.2			
LTB	LTB1-1	12	1.4	86.7	13.3		160.4	2.6							1695.7	2.02	41.17	3.43
LTB	LTB1-1	13													1699.5			
LTB	LTB2-1	0													1662.4	1.92		3.19
LTB	LTB2-1	1													1682.1			
LTB	LTB2-1	2													1703.6	1.97		3.36
LTB	LTB2-1	3													1718.5			
LTB	LTB2-1	4													1727.7	1.98		3.42
LTB	LTB2-1	5													1725.3			
LTB	LTB2-1	6													1729.2	1.96		3.39
LTB	LTB2-1	7													1732.6			
LTB	LTB2-1	8													1739.0	2.01		3.50
LTB	LTB2-1	9													1737.0			
LTB	LTB2-1	10													1743.5	2.01		3.50
LTB	LTB2-1	11													1743.9			
LTB	LTB2-1	12													1744.9	2.03		3.54

APPENDIX B.

Raw data from the Dry Tortugas study area.

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	%Carb	Vp (m/s)	IMP (kg/cm^2s)
147	0	1.68	2.72	58.18	1.58	61.26	0.00	21.56	55.93	22.61	6.08	14.8	92.1		
147	2	1.68	2.70	57.99	1.57	61.04							91.8		
147	4	1.75	2.73	51.07	1.39	58.20							91.7	1497.13	2.62
147	6	1.70	2.73	55.05	1.50	60.08							90.4	1497.33	2.54
147	8	1.76	2.73	47.76	1.30	56.60							91.8	1497.33	2.64
147	10	1.76	2.75	47.92	1.32	56.86	0.08	26.39	53.63	19.90	5.80	17.9	88.4	1501.86	2.64
147	12	1.80	2.73	44.15	1.21	54.69							91.1	1499.04	2.70
147	14	1.78	2.74	45.41	1.24	55.41							88.8	1505.09	2.68
147	16	1.78	2.72	46.44	1.26	55.81							91.6	1505.09	2.67
147	18	1.79	2.74	46.16	1.26	55.83							88.7	1503.78	2.69
147	20	1.82	2.72	42.81	1.16	53.79	0.98	32.65	45.61	20.76	5.68	19.5	90.1	1500.75	2.73
147	22	1.80	2.71	43.99	1.19	54.41							90.7	1503.78	2.70
147	24	1.80	2.75	45.29	1.24	55.43							90.0	1502.26	2.70
147	26	1.80	2.79	44.53	1.24	55.38							90.0	1500.95	2.71
147	28	1.82	2.79	43.10	1.20	54.56							90.1	1499.64	2.73
147	30	1.82	2.76	41.58	1.15	53.41	2.16	40.55	38.72	18.57	5.24	26.5	90.8	1504.38	2.74
147	32	1.84	2.74	40.65	1.11	52.65							90.9	1504.38	2.77
147	34	1.85	2.76	40.57	1.12	52.83							91.2	1508.95	2.79
147	36	1.84	2.77	41.41	1.15	53.44							90.5	1507.22	2.77
147	38	1.86	2.72	38.63	1.05	51.24							90.1	1511.61	2.81
147	40	1.87	2.75	37.94	1.04	51.06	3.77	44.35	32.03	19.85	4.97	31.9	90.5	1513.14	2.82
147	42	1.87	2.75	37.97	1.04	51.07							90.2	1508.34	2.82
147	44	1.86	2.72	39.04	1.06	51.51							96.7	1514.27	2.81
147	46	1.86	2.80	39.03	1.09	52.25							91.6	1517.36	2.83
147	48	1.81	2.72	43.22	1.18	54.06							92.8	1518.70	2.75
147	50	1.84	2.75	40.83	1.12	52.89	3.71	47.84	31.37	17.07			92.0	1512.53	2.78
147	52	1.89	2.74	36.81	1.01	50.18							91.9	1507.94	2.85
147	54	1.89	2.80	37.08	1.04	50.93							91.4	1518.70	2.86
147	56	1.86	2.78	39.65	1.10	52.46							91.4	1515.61	2.82
147	58	1.87	2.78	37.98	1.06	51.41							91.5	1514.27	2.84
147	60	1.87	2.77	38.90	1.08	51.83	4.46	49.83	27.77	17.94			92.7	1520.45	2.84
147	62	1.88	2.76	38.14	1.05	51.30							90.1	1506.61	2.83
147	64	1.92	2.75	34.65	0.95	48.82							88.1	1512.94	2.90
147	66	1.89	2.75	36.48	1.00	50.09							89.9	1519.11	2.87
147	68	1.89	2.74	35.98	0.99	49.68							88.1	1517.56	2.87
147	70	1.91	2.77	34.81	0.97	49.12	4.13	50.15	29.60	16.12			91.9	1513.14	2.88
147	72	1.88	2.74	37.44	1.03	50.63							91.6	1523.97	2.87
147	74	1.88	2.74	37.25	1.02	50.53							90.0	1527.10	2.87
147	76	1.89	2.76	36.48	1.01	50.18							89.3	1522.42	2.88
147	78	1.92	2.74	34.25	0.94	48.39							89.7	1522.42	2.92
147	80	1.90	2.76	35.69	0.98	49.59	5.39	47.94	26.86	19.81			90.9	1528.66	2.90
147	82	1.93	2.74	33.31	0.91	47.72							92.3	1528.87	2.95
147	84	1.94	2.77	32.64	0.90	47.44							91.7	1528.87	2.97
147	86	1.96	2.76	30.30	0.83	45.50							91.8	1530.44	3.00
147	88	2.01	2.73	26.37	0.72	41.82	16.56	38.63	25.68	19.13			91.6	1529.07	3.07
147	90	1.96	2.77	31.18	0.86	46.30	9.71	46.58	25.17	18.54	4.21	54.0	93.7		
147	92	1.97	2.73	30.81	0.84	45.66							92.1		
147	94	1.97	2.73	29.85	0.81	44.87							94.1		
147	96	1.98	2.77	29.28	0.81	44.78							90.4	1549.40	3.07
147	98	1.95	2.77	33.08	0.92	47.81							94.5	1529.26	2.98
147	100	1.95	2.79	33.05	0.92	47.96	6.43	48.96	23.74	20.87	4.59	41.5	91.7		
147	102	1.92	2.72	34.48	0.94	48.42							93.0	1545.81	2.97
147	104	1.92	2.76	33.88	0.93	48.29							91.9	1545.96	2.97
147	106	1.91	2.76	35.65	0.98	49.62							93.0		
147	108	1.94	2.75	33.28	0.92	47.80							93.5		
147	110	1.95	2.78	32.58	0.91	47.55	10.81	42.34	24.59	22.25	4.43	46.4	94.1	1507.14	2.94
147	112	1.92	2.74	34.20	0.94	48.41							91.2	1533.85	2.94
147	114	1.94	2.75	32.91	0.91	47.52							92.1	1542.24	2.99
147	116	1.93	2.75	33.33	0.92	47.86							88.9	1542.45	2.97
147	118	1.96	2.75	31.84	0.88	46.70							92.2	1540.84	3.02
147	120	1.91	2.75	34.85	0.96	48.98	7.45	47.07	22.85	22.63	4.28	51.5	92.1	1539.45	2.94
147	122	1.93	2.76	33.26	0.92	47.82							92.6	1529.93	2.95
147	124	1.93	2.78	34.38	0.96	48.87							91.3	1528.56	2.95
147	126	1.96	2.78	33.25	0.92	48.00							90.5	1541.26	3.02
147	128	1.98	2.78	31.02	0.86	46.26							90.6	1557.44	3.08

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	%Carb	Vp (m/s)	IMP (kg/ cm^2s)
147	130	1.95	2.75	31.44	0.86	46.33	7.89	40.57	25.86	25.68	4.96	32.1	88.1	1557.65	3.04
147	132	1.97	2.73	29.84	0.81	44.90							88.7	1562.57	3.07
147	134	1.98	2.75	30.25	0.83	45.45							87.8	1557.65	3.08
147	136	1.98	2.79	30.79	0.86	46.23							88.6	1545.87	3.05
147	138	1.93	2.77	33.59	0.93	48.20							88.0	1557.97	3.00
147	140	1.94	2.75	32.72	0.90	47.35	6.33	42.14	23.57	27.96	5.22	26.8	89.1	1560.03	3.03
147	142	1.93	2.75	33.58	0.92	48.00							90.5	1553.91	3.00
147	144	1.93	2.75	33.23	0.91	47.76							90.9	1557.39	3.01
147	146	1.94	2.77	32.41	0.90	47.28							89.4	1547.84	3.01
147	148	1.93	2.75	33.12	0.91	47.67							90.2	1543.42	2.98
147	150	1.94	2.75	32.93	0.90	47.50	4.80	44.54	22.38	28.28	5.79	18.1	91.9	1542.03	2.99
147	152	1.97	2.76	30.82	0.85	45.97							89.0	1540.63	3.03
147	154	1.96	2.83	32.44	0.92	47.86							89.3	1534.47	3.00
147	156	1.96	2.77	31.98	0.89	46.99							86.1	1552.97	3.05
147	158	1.91	2.75	34.03	0.94	48.35							89.6	1553.18	2.97
147	160	1.93	2.76	32.94	0.91	47.64	3.06	38.47	24.73	33.74	7.04	7.6	90.4	1551.97	3.00
147	162	1.97	2.78	31.72	0.88	46.89							85.9	1550.56	3.05
147	164	1.98	2.76	30.66	0.85	45.87							86.4	1549.36	3.06
147	166	1.92	2.75	34.03	0.94	48.35							89.3	1543.55	2.96
147	168	1.85	2.75	39.98	1.10	52.41							90.2	1535.58	2.84
147	170	1.93	2.72	34.00	0.92	48.02	7.82	38.10	26.13	30.94	6.51	11.0	91.1	1523.19	2.94
147	172	1.82	2.71	41.00	1.11	52.62							86.4	1534.40	2.79
147	174	1.84	2.73	38.66	1.06	51.37							87.3	1518.73	2.80
147	176	1.91	2.75	34.66	0.95	48.85							87.4	1508.35	2.89
147	178	1.86	2.71	37.51	1.02	50.43							87.5	1518.20	2.83
147	180	1.90	2.74	34.30	0.94	48.45	1.16	26.04	35.10	37.70	7.59	5.2	84.2	1518.61	2.88
178	0	1.74	2.71	44.30	1.17	53.93	2.23	39.71	44.72	13.34	4.37	48.4	90.6		
178	2	1.78	2.76	42.47	1.14	53.36									
178	4	1.72	2.71	47.27	1.25	55.56									
178	6	1.73	2.72	45.43	1.21	54.66									
178	8	1.73	2.75	46.86	1.26	55.68									
178	10	1.75	2.74	45.04	1.21	54.66	0.67	29.2	50.68	19.46	5.56	21.2	91.3		
178	12	1.73	2.74	46.60	1.25	55.48									
178	14	1.75	2.71	43.72	1.16	53.66									
178	16	1.77	2.74	42.99	1.15	53.52									
178	18	1.73	2.74	46.75	1.25	55.56									
178	20	1.80	2.73	38.88	1.04	50.87	0.68	31.61	47.75	19.96	5.62	20.3	91.6		
178	22	1.80	2.73	39.38	1.05	51.25									
178	24	1.77	2.72	41.50	1.10	52.40									
178	26	1.75	2.73	44.76	1.19	54.43									
178	28	1.81	2.73	38.26	1.02	50.52									
178	30	1.82	2.71	36.69	0.97	49.24	1.51	39.68	41.83	16.98	5.28	25.7	91.1		
178	32	1.84	2.73	35.91	0.96	48.94									
178	34	1.85	2.72	34.67	0.92	47.97									
178	36	1.82	2.73	37.34	1.00	49.91									
178	38	1.81	2.73	38.20	1.02	50.48									
178	40	1.84	2.76	36.85	0.99	49.86	1.31	45.17	36.76	16.76	4.95	32.4	92.2		
178	42	1.84	2.75	36.79	0.99	49.71									
178	44	1.83	2.73	36.92	0.98	49.61									
178	46	1.82	2.74	37.39	1.00	49.97									
178	48	1.82	2.73	37.81	1.01	50.19									
178	50	1.82	2.73	37.46	1.00	49.97	3.06	45.43	33.39	18.12	5.12	28.8	93.1	1575.00	2.87
178	52	1.84	2.74	36.40	0.97	49.35									
178	54	1.78	2.73	40.84	1.09	52.11								1566.67	2.79
178	56	1.81	2.73	38.30	1.02	50.53								1566.88	2.84
178	58	1.81	2.73	38.34	1.02	50.55								1573.37	2.85
178	60	1.82	2.73	37.31	0.99	49.85	1.96	43.94	36.19	17.91	5.17	27.8	91.2	1568.49	2.86
178	62	1.79	2.74	40.52	1.09	52.04								1563.65	2.80
178	64	1.85	2.74	35.30	0.94	48.57								1572.95	2.91
178	66	1.80	2.75	40.19	1.08	51.89								1561.01	2.80
178	68	1.83	2.72	36.72	0.98	49.41								1563.61	2.86
178	70	1.81	2.75	38.78	1.04	51.04	2.38	44.29	35.24	18.08	5.04	30.4	91.4	1561.38	2.83
178	72	1.82	2.74	37.72	1.01	50.22								1562.16	2.84
178	74	1.83	2.73	36.44	0.97	49.30								1561.54	2.86

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	%Carb	Vp (m/s)	IMP (kg/cm^2s)
178	76	1.84	2.74	35.73	0.95	48.84									
178	78	1.85	2.74	35.01	0.94	48.36								1559.52	2.87
178	80	1.85	2.73	34.45	0.92	47.84								1565.14	2.90
178	82	1.84	2.73	35.83	0.95	48.83	0	46.09	37.5	16.41	5.20	27.2	90.4	1565.72	2.90
178	84	1.88	2.71	32.40	0.86	46.20									
178	86	1.82	2.74	37.93	1.02	50.39								1535.23	2.88
178	88	1.83	2.74	36.69	0.98	49.51									
178	90	1.85	2.73	34.71	0.92	48.05								1574.52	2.88
178	92	1.88	2.73	32.46	0.86	46.36	4.04	47.3	30.44	18.23	4.76	36.9	90.7	1577.80	2.92
178	94	1.87	2.73	33.49	0.89	47.13								1564.77	2.94
178	96	1.87	2.73	32.96	0.88	46.75								1571.26	2.93
178	98	1.87	2.73	33.82	0.90	47.46								1568.21	2.94
178	100	1.85	2.74	34.92	0.93	48.29								1574.94	2.94
178	102	1.91	2.75	30.71	0.83	45.22	8.08	41.8	29.88	20.23	4.85	34.7	86.5	1584.00	2.94
178	104	1.87	2.74	33.36	0.89	47.17								1569.87	3.00
178	106	1.89	2.80	33.54	0.92	47.84									
178	108	1.88	2.80	34.82	0.95	48.75								1580.52	2.99
178	110	1.88	2.74	32.94	0.88	46.81								1593.17	2.99
178	112	1.88	2.78	33.98	0.92	48.01	10.1	40.95	29.62	19.33	4.55	42.7	83.8	1584.25	2.97
178	114	1.89	2.77	32.72	0.89	46.97								1582.81	2.98
178	116	1.92	2.77	30.99	0.84	45.62								1579.52	2.99
178	118	1.93	2.78	30.34	0.82	45.18									
178	120	1.92	2.76	30.63	0.83	45.21								1589.43	3.07
178	122	1.89	2.80	33.63	0.92	47.94	19.57	38.38	23.13	18.92	3.11	115.8	88.5	1589.43	3.05
178	124	1.91	2.78	32.13	0.87	46.59								1576.45	2.99
178	126	1.91	2.77	31.62	0.85	46.07								1587.98	3.03
178	128	1.97	2.76	27.55	0.74	42.65								1601.36	3.05
178	130	1.85	2.75	35.46	0.95	48.76	5.16	42.39	26.25	26.2	6.23	13.3	86.1		
203	0	1.75	2.66	42.33	1.10	52.37	4.39	18.2	57.27	20.15	5.74	18.7	81.0	1625.55	2.84
203	2	1.78	2.72	40.39	1.07	51.75							88.1	1622.37	2.90
203	4	1.79	2.70	39.12	1.03	50.74							84.5	1631.94	2.92
203	6	1.82	2.71	36.73	0.97	49.27							86.4	1630.54	2.97
203	8	1.80	2.68	37.36	0.98	49.42							86.2	1645.08	2.97
203	10	1.86	2.75	34.74	0.93	48.26	25.3	12.3	46.36	16.04	3.39	95.4	84.4	1637.36	3.05
203	12	1.89	2.74	31.93	0.85	46.05							87.2	1637.13	3.10
203	14	1.96	2.72	27.02	0.72	41.83							85.3	1621.95	3.17
203	16	1.89	2.71	31.33	0.83	45.34							85.8	1622.53	3.07
203	18	1.85	2.71	34.44	0.91	47.67							88.3	1623.12	3.00
203	20	1.83	2.71	35.73	0.95	48.59	13.78	15.71	50.71	19.79	4.59	41.5	83.1	1635.89	3.00
203	22	1.92	2.70	28.60	0.75	42.99							86.5	1626.10	3.13
203	24	1.89	2.77	33.11	0.90	47.23							82.7	1649.69	3.11
203	26	1.88	2.70	31.60	0.83	45.41							88.8	1644.01	3.09
203	28	1.84	2.70	34.59	0.91	47.66							87.0	1628.52	3.00
203	30	1.82	2.71	37.10	0.98	49.56	9.99	20.66	53.47	15.88	4.85	34.7	87.6	1615.46	2.94
203	32	1.85	2.72	34.91	0.93	48.09							87.8	1622.57	3.00
203	34	1.84	2.71	35.09	0.93	48.12							86.5	1631.35	3.00
203	36	1.89	2.70	31.01	0.82	44.95							74.2	1626.36	3.07
203	38	1.87	2.70	32.72	0.86	46.34							86.2	1613.71	3.01
203	40	1.85	2.72	34.20	0.91	47.58	8.36	18.29	57.55	15.8	5.16	28.0	83.8	1604.15	2.98
203	42	1.80	2.75	39.38	1.06	51.35							82.9	1607.06	2.90
203	44	1.82	2.75	38.04	1.02	50.52							85.8	1613.32	2.94
203	46	1.81	2.75	38.61	1.04	50.87							87.1	1608.62	2.92
203	48	1.80	2.70	38.71	1.02	50.48							87.9	1611.55	2.89
203	50	1.84	2.72	35.11	0.93	48.24	5.13	17.35	48.68	28.83			87.6	1619.42	2.99
203	52	1.82	2.70	36.77	0.97	49.18							88.1	1616.46	2.94
203	54	1.82	2.70	37.12	0.98	49.50							84.8	1621.79	2.94
203	56	1.80	2.76	40.29	1.08	52.01							87.2	1611.74	2.90
203	58	1.77	2.69	41.24	1.08	51.98							87.3	1612.91	2.85
203	60	1.76	2.69	42.36	1.11	52.66	0.82	11.34	57.53	30.3	6.78	9.1	87.4	1611.73	2.83
203	62	1.77	2.69	40.74	1.07	51.73							83.4	1613.88	2.86
203	64	1.77	2.70	40.95	1.08	51.91							84.8	1604.73	2.84
203	66	1.76	2.69	41.36	1.09	52.04							87.0	1611.92	2.84
203	68	1.78	2.72	40.75	1.08	51.95							85.0	1611.33	2.87
203	70	1.76	2.70	42.10	1.11	52.62	0.88	10.75	55.37	33	7.06	7.5	84.9	1611.91	2.84

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	%Carb	Vp (m/s)	IMP (kg/cm^2s)
203	72	1.78	2.71	40.66	1.07	51.79									
203	74	1.81	2.72	38.05	1.01	50.25							86.1	1615.62	2.87
203	76	1.76	2.80	44.93	1.23	55.10							87.8	1621.70	2.94
203	78	1.78	2.71	41.16	1.09	52.18							87.4	1617.56	2.85
203	80	1.79	2.70	39.49	1.04	50.99	1.82	10.95	57.16	30.07	6.62	10.2	87.5	1611.51	2.86
203	82	1.85	2.73	35.13	0.94	48.37							87.1	1609.95	2.88
203	84	1.85	2.71	34.02	0.90	47.34							87.5	1535.58	2.84
203	86	1.89	2.74	32.09	0.86	46.17							86.7	1618.04	3.00
203	88	1.87	2.69	32.49	0.85	46.08							85.5	1571.44	2.97
203	90	1.77	2.70	40.97	1.08	51.92	5.7	17.99	50.83	25.48	5.99	15.7	86.7	1659.17	3.10
203	92	1.78	2.69	39.86	1.05	51.18							84.1	1555.98	2.76
203	94	1.82	2.70	36.73	0.97	49.24							86.6	1496.28	2.67
203	96	1.81	2.70	37.71	0.99	49.82							83.4	1588.93	2.89
203	98	1.79	2.72	40.15	1.06	51.57							84.1	1589.12	2.87
203	100	1.78	2.69	40.04	1.05	51.31	1.64	13.57	49.17	35.62	7.36	6.1	83.3	1579.91	2.82
203	102	1.76	2.73	42.74	1.14	53.26							84.2	1564.98	2.79
203	104	1.77	2.73	42.13	1.12	52.92								1569.68	2.77
203	106	1.78	2.73	41.08	1.10	52.27								1569.68	2.78
203	108	1.79	2.74	40.90	1.09	52.24								1569.68	2.80
203	110	1.79	2.71	40.05	1.06	51.47	2.77	14.84	43.67	38.72	7.52	5.4	86.0	1572.89	2.81
203	112	1.80	2.73	39.68	1.06	51.41								1578.97	2.82
203	114	1.75	2.74	44.19	1.18	54.19								1571.38	2.82
203	116	1.80	2.74	39.26	1.05	51.23								1560.89	2.74
203	118	1.85	2.74	35.53	0.95	48.74								1589.90	2.87
203	120	1.83	2.73	36.60	0.98	49.43	2.16	15.28	43.81	38.74	7.69	4.8	80.2	1587.01	2.93
203	122	1.85	2.75	35.62	0.96	48.86								1590.10	2.91
203	124	1.79	2.75	40.83	1.09	52.27								1581.07	2.92
203	126	1.83	2.75	37.09	0.99	49.87								1583.38	2.83
203	128	1.87	2.75	33.69	0.91	47.51								1591.66	2.91
203	130	1.87	2.74	33.53	0.90	47.25	1.9	22.98	38.06	37.06	7.35	6.1	85.2	1602.76	3.00
203	132	1.87	2.75	34.16	0.92	47.82								1591.85	2.98
203	134	1.86	2.76	35.21	0.95	48.71								1605.90	3.00
203	136	1.82	2.76	38.60	1.04	50.95								1588.96	2.95
203	138	1.83	2.76	37.43	1.01	50.20								1582.82	2.87
203	140	1.82	2.76	38.46	1.04	50.92	3	19.93	39.73	37.3	6.87	8.5	86.0	1579.38	2.89
203	142	1.83	2.76	37.35	1.01	50.19								1586.45	2.89
203	144	1.87	2.75	34.04	0.91	47.76								1586.06	2.91
203	146	1.88	2.77	33.46	0.91	47.54								1592.04	2.98
203	148	1.85	2.76	35.99	0.97	49.27								1593.59	3.00
203	150	1.83	2.74	36.63	0.98	49.53	7.9	23.83	34.62	33.6	6.15	14.1	85.2	1598.26	2.96
203	152	1.91	2.76	31.25	0.84	45.71								1586.06	2.91
203	154	1.89	2.76	32.84	0.89	46.97								1596.89	3.05
203	156	1.87	2.76	34.35	0.93	48.07								1635.19	3.09
203	158	1.86	2.76	34.92	0.94	48.48								1612.83	3.01
203	160	1.88	2.74	32.90	0.88	46.86	6.8	32.27	31.54	29.4	5.55	21.3	82.1	1594.17	2.97
203	162	1.87	2.76	34.22	0.92	47.99								1616.21	3.04
203	164	1.88	2.77	33.94	0.92	47.84								1611.44	3.01
203	166	1.87	2.78	35.16	0.96	48.87								1608.66	3.02
203	168	1.97	2.78	27.80	0.75	42.98								1522.21	2.84
														1523.12	3.00
208	0	1.79	2.73	40.81	1.09	52.15	0.39	10.88	69.97	18.74	6.35	12.3	87.8	1530.35	2.73
208	2	1.79	2.73	40.76	1.09	52.12								1524.14	2.72
208	4	1.77	2.73	42.25	1.13	53.01								1521.05	2.69
208	6	1.78	2.73	41.76	1.11	52.71								1522.59	2.70
208	8	1.78	2.74	41.06	1.10	52.33								1521.05	2.71
208	10	1.79	2.74	40.62	1.09	52.09	0.53	11.26	63.19	25.03	6.83	8.8	88.3	1517.97	2.72
208	12	1.75	2.73	43.72	1.17	53.82								1517.77	2.66
208	14	1.77	2.73	41.78	1.11	52.69								1509.93	2.68
208	16	1.78	2.73	41.51	1.11	52.56								1512.37	2.69
208	18	1.78	2.73	41.20	1.10	52.33								1511.76	2.69
208	20	1.76	2.74	43.85	1.17	53.96	0.30	16.18	59.15	24.37	6.39	11.9	88.4	1514.21	2.66
208	22	1.79	2.74	40.30	1.08	51.86								1512.07	2.71
208	24	1.79	2.74	41.05	1.10	52.36								1514.93	2.70
208	26	1.81	2.72	38.57	1.03	50.64								1516.26	2.74
208	28	1.82	2.73	37.97	1.01	50.34								1519.34	2.76

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	%Carb	Vp (m/s)	IMP (kg/cm^2s)
208	30	1.81	2.74	39.02	1.05	51.13	0.40	17.73	58.40	23.48	6.37	12.1	89.1	1520.88	2.75
208	32	1.81	2.74	38.65	1.03	50.85								1517.80	2.75
208	34	1.82	2.74	38.08	1.02	50.50								1520.88	2.77
208	36	1.85	2.73	35.21	0.94	48.40								1522.63	2.81
208	38	1.81	2.75	38.63	1.04	50.93								1524.18	2.77
208	40	1.82	2.75	38.44	1.03	50.77	0.82	18.10	57.08	24.00	6.51	11.0	88.8	1521.08	2.76
208	42	1.84	2.75	36.16	0.97	49.29								1522.63	2.81
208	44	1.83	2.75	37.41	1.00	50.12								1524.18	2.79
208	46	1.82	2.75	38.16	1.02	50.58								1527.49	2.78
208	48	1.82	2.75	38.09	1.02	50.59								1525.93	2.78
208	50	1.84	2.74	36.57	0.98	49.50	0.25	18.90	56.87	23.97	6.59	10.4	89.3	1525.20	2.80
208	52	1.84	2.75	36.67	0.98	49.62								1530.28	2.81
208	54	1.84	2.75	36.43	0.98	49.45								1532.46	2.82
208	56	1.83	2.75	37.35	1.00	50.07								1531.51	2.80
208	58	1.83	2.75	37.68	1.01	50.33								1528.59	2.79
208	60	1.84	2.76	36.54	0.98	49.59	1.70	14.68	59.04	24.58	6.64	10.0	90.5	1530.35	2.82
208	62	1.84	2.76	36.50	0.98	49.57								1525.89	2.81
208	64	1.83	2.76	37.65	1.01	50.33								1530.02	2.80
208	66	1.80	2.76	39.97	1.08	51.83								1526.17	2.75
208	68	1.82	2.76	38.08	1.02	50.62								1526.17	2.78
208	70	1.83	2.76	37.17	1.00	50.01	0.81	17.93	55.26	26.00	6.66	9.9	89.5	1523.28	2.79
208	72	1.82	2.75	38.01	1.02	50.54								1526.38	2.78
208	74	1.82	2.76	38.56	1.04	50.93								1523.49	2.77
208	76	1.83	2.75	37.10	1.00	49.92								1523.28	2.79
208	78	1.85	2.76	36.17	0.97	49.35								1522.67	2.81
208	80	1.83	2.76	37.22	1.00	50.04								1522.27	2.79
208	82	1.83	2.76	37.42	1.01	50.19								1525.36	2.79
208	84	1.82	2.76	38.42	1.04	50.88								1526.71	2.78
208	86	1.84	2.76	36.90	0.99	49.82									
208	88	1.94	2.77	29.63	0.80	44.48									
208	90	1.50	2.77	83.08		69.20	0.46	20.65	44.42	34.47	7.68	4.9	86.3		
208	92	1.58	2.76	67.96	1.83	64.72									
208	94	1.68	2.77	53.10	1.43	58.93									
208	96	1.73	2.77	47.20	1.28	56.08									
208	98	1.70	2.77	51.69	1.40	58.32									
208	100	1.86	2.78	35.42	0.96	49.03	1.18	18.24	40.81	39.77	8.01	3.9	88.3	1558.30	2.64
208	102	1.83	2.77	37.94	1.03	50.64								1548.70	2.88
208	104	1.82	2.76	38.16	1.03	50.74								1545.52	2.83
208	106	1.85	2.76	35.49	0.96	48.86								1534.31	2.80
208	108	1.86	2.75	34.92	0.94	48.43								1532.14	2.84
208	110	1.85	2.77	36.11	0.98	49.41	0.85	28.53	39.46	31.17	7.48	5.6	88.3	1543.67	2.87
208	112	1.82	2.76	38.83	1.05	51.16								1547.82	2.86
208	114	1.82	2.76	38.74	1.04	51.10								1532.60	2.78
208	116	1.83	2.76	37.48	1.01	50.25								1526.92	2.77
208	118	1.83	2.77	37.76	1.02	50.56								1530.77	2.80
208	120	1.89	2.78	33.47	0.91	47.61	0.15	21.13	41.16	37.55	8.16	3.5	87.8	1524.15	2.79
208	122	1.91	2.78	31.61	0.86	46.15								1528.39	2.88
208	124	1.95	2.76	28.23	0.76	43.25								1559.73	2.98
208	126	1.90	2.78	32.30	0.88	46.72								1559.73	3.05
208	128	1.93	2.77	30.09	0.81	44.87								1561.15	2.97
208	130	1.94	2.75	28.82	0.77	43.63	1.88	27.66	36.71	33.75	7.77	4.6	87.7	1555.88	3.00
208	132	1.94	2.76	29.13	0.79	44.00								1558.90	3.02
208	134	1.91	2.78	31.52	0.85	46.07								1571.55	3.05
208	136	1.95	2.76	28.25	0.76	43.25								1583.99	3.03
208	138	1.89	2.78	33.19	0.90	47.41								1575.24	3.08
208	140	1.91	2.78	31.62	0.86	46.19	2.33	32.12	37.40	28.15	6.43	11.6	91.1	1571.93	2.97
208	142	1.89	2.76	32.75	0.88	46.93								1555.41	2.97
208	144	1.91												1549.96	2.93
208	146	1.88	2.77	33.55	0.91	47.55								1559.64	2.98
208	148	1.90	2.75	31.73	0.85	46.04								1557.60	2.93
208	150	1.91	2.78	31.80	0.86	46.33	14.86	28.89	32.96	23.29	4.77	36.7	88.0	1555.78	2.96
208	152	1.89	2.77	32.82	0.89	47.06								1552.76	2.96
208	154	1.89	2.78	32.99	0.89	47.22								1551.15	2.94
208	156	1.91	2.81	33.02	0.91	47.56								1557.60	2.95
208	158	1.93	2.81	30.91	0.85	45.85								1577.08	3.00
														1570.46	3.03

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	%Carb	Vp (m/s)	IMP (kg/cm^2s)
208	160	1.91	2.75	30.91	0.83	45.36	16.36	35.93	26.73	20.99	4.19	54.8	91.7	1582.08	3.02
208	162	1.92	2.80	31.68	0.87	46.46									
208	164	1.89	2.78	33.15	0.90	47.38								1580.41	3.04
208	166	1.92	2.78	30.95	0.84	45.67									
208	168	1.91	2.77	31.49	0.85	45.97								1562.27	3.00
208	170	1.92	2.77	30.64	0.83	45.32	4.59	33.18	39.27	22.96	6.00	15.6	90.9	1565.54	2.99
208	172	1.93	2.77	29.81	0.81	44.66								1575.42	3.03
208	174	1.92	2.77	30.46	0.82	45.15								1580.62	3.06
208	176	1.90	2.75	32.03	0.86	46.25								1579.17	3.04
208	178	1.91	2.75	31.26	0.84	45.67								1571.72	2.98
208	180	1.91	2.77	31.27	0.85	45.82	5.23	25.72	43.85	25.19	6.34	12.3	92.7	1561.10	2.98
208	182	1.92	2.76	30.96	0.84	45.53								1559.11	2.98
208	184	1.87	2.75	34.22	0.92	47.86								1572.21	3.01
208	186	1.94	2.76	29.02	0.78	43.88								1567.12	2.92
208	188	1.86	2.78	35.36	0.96	48.99									
208	190	1.91	2.76	31.49	0.85	45.91	3.65	29.25	42.49	24.60	6.17	13.9	90.6		
208	192	1.88	2.75	32.88	0.88	46.89								1537.76	2.90
208	194	1.80	2.76	40.08	1.08	51.90								1530.23	2.76
208	196	1.86	2.75	34.45	0.93	48.09									
208	198	1.91	2.76	31.17	0.84	45.64								1547.86	2.96
208	200	1.84	2.76	37.02	1.00	49.94	4.23	25.76	45.67	24.33	6.20	13.6	90.9	1548.07	2.84
208	202	1.85	2.81	37.29	1.02	50.53								1544.98	2.86
208	204	1.85	2.78	36.39	0.99	49.66								1549.75	2.87
208	206	1.88	2.76	33.52	0.90	47.43								1546.36	2.90
208	208	1.83	2.75	36.92	0.99	49.82								1554.13	2.85
208	210	1.82	2.76	38.61	1.04	50.99	0.94	22.29	52.34	24.43	6.50	11.0	92.5	1535.34	2.79
208	212	1.84	2.77	36.70	0.99	49.84								1532.22	2.83
208	214	1.85	2.80	37.37	1.02	50.58								1540.04	2.84
208	216	1.88	2.77	33.70	0.91	47.67								1543.20	2.90
208	218	1.87	2.75	34.02	0.91	47.76								1549.54	2.90
208	220	1.87	2.75	34.07	0.92	47.78	1.5	26.97	47.37	23.82	6.14	14.2	91.4	1546.36	2.89
208	222	1.89	2.77	32.96	0.89	47.10								1552.73	2.93
208	224	1.90	2.77	32.34	0.87	46.61								1551.34	2.94
208	226	1.85	2.74	35.75	0.96	48.93								1548.16	2.86
208	228	1.86	2.79	36.11	0.98	49.55								1543.40	2.86
208	230	1.84	2.75	36.42	0.98	49.44	0.30	30.21	46.75	22.75	6.04	15.2	91.0	1543.40	2.84
208	232	1.83	2.77	37.76	1.02	50.53								1540.66	2.82
208	234	1.85	2.77	36.22	0.98	49.46								1539.70	2.84
208	236	1.83	2.74	37.08	0.99	49.80								1540.11	2.82
210	0	1.69	2.71	50.24	1.33	57.08	0.59	22.67	51.48	25.26	5.97	16.0	84.8		
210	2	1.68	2.73	52.76	1.41	58.48									
210	4	1.71	2.73	49.27	1.32	56.81									
210	6	1.74	2.72	44.95	1.20	54.46									
210	8	1.72	2.76	47.98	1.29	56.37									
210	10	1.75	2.73	44.76	1.19	54.43	1.79	21	56.24	20.98	5.5	22.1	87.1		
210	12	1.74	2.74	45.86	1.23	55.10									
210	14	1.67	2.73	53.27	1.42	58.70								1534.94	2.57
210	16	1.67	2.74	53.64	1.44	58.94								1513.86	2.53
210	18	1.70	2.74	50.62	1.36	57.55									
210	20	1.70	2.75	50.61	1.36	57.61	1.55	25.5	52.45	20.5	4.93	32.8	86.9	1490.07	2.53
210	22	1.68	2.75	52.59	1.41	58.53								1534.68	2.58
210	24	1.75	2.74	44.95	1.20	54.64								1549.19	2.71
210	26	1.78	2.75	41.73	1.12	52.83								1542.14	2.75
210	28	1.78	2.75	42.13	1.13	53.08								1542.95	2.74
210	30	1.80	2.74	39.67	1.06	51.53	1.25	26.02	50.23	22.49	5.36	24.3	89.1	1540.91	2.77
210	32	1.79	2.75	40.89	1.10	52.33								1547.99	2.77
210	34	1.77	2.74	42.17	1.13	53.05								1552.73	2.76
210	36	1.78	2.74	41.72	1.12	52.76								1560.89	2.78
210	38	1.79	2.75	41.01	1.10	52.41								1554.72	2.78
210	40	1.79	2.76	40.94	1.10	52.44	6.47	33.47	40.55	19.51	4.7	38.5	90.1	1553.60	2.78
210	42	1.80	2.76	40.57	1.09	52.22								1558.57	2.80
210	44	1.82	2.76	38.56	1.04	50.99								1560.37	2.84
210	46	1.79	2.75	40.96	1.10	52.42								1560.57	2.79
210	48	1.81	2.75	39.09	1.05	51.25								1563.77	2.83

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	% Carb	Vp (m/s)	IMP (kg/ cm^2s)
210	50	1.81	2.75	39.36	1.06	51.41	3.19	32.44	44.17	20.2	5.26	26.1	91.1	1562.17	2.82
210	52	1.84	2.76	36.17	0.97	49.33								1565.58	2.89
210	54	1.82	2.77	38.97	1.05	51.29								1562.58	2.84
210	56	1.80	2.77	40.46	1.09	52.26								1559.39	2.81
210	58	1.80	2.76	40.77	1.10	52.39								1554.83	2.79
210	60	1.79	2.79	41.72	1.14	53.19	4.37	32.8	41.96	20.87	4.9	33.5	91.0	1554.83	2.79
210	62	1.77	2.80	44.17	1.21	54.71								1540.70	2.73
210	64	1.79	2.80	42.26	1.16	53.61								1550.09	2.78
210	66	1.79	2.77	41.40	1.12	52.84								1556.00	2.79
210	68	1.80	2.77	40.16	1.09	52.08								1557.39	2.81
210	70	1.83	2.77	37.44	1.01	50.31	4.73	33.09	41.04	21.14	4.97	31.9	91.6	1555.59	2.85
210	72	1.83	2.76	37.08	1.00	49.94								1558.16	2.86
210	74	1.83	2.76	37.66	1.01	50.35								1560.53	2.85
210	76	1.85	2.75	35.73	0.96	48.98								1556.72	2.88
210	78	1.83	2.77	37.72	1.02	50.48								1557.49	2.85
210	80	1.86	2.77	35.41	0.96	48.88	3.46	36.75	38.52	21.26	5.38	24.0	90.5	1558.06	2.89
210	82	1.83	2.76	37.86	1.02	50.54									
210	84	1.95	2.77	28.79	0.78	43.76									
210	86	1.99	2.77	25.76	0.70	41.05									
210	88	1.96	2.74	27.42	0.73	42.29									
210	90	1.91	2.82	32.44	0.89	47.15	7.1	34.74	35.98	22.17	5.36	24.3	92.1		
210	92	1.92	2.77	30.80	0.83	45.41									
210	94	1.91	2.76	31.11	0.84	45.62									
210	96	1.91	2.76	31.28	0.84	45.78									
210	98	1.92	2.77	30.76	0.83	45.39									
210	100	1.90	2.77	31.92	0.86	46.36	5.3	36.78	36.52	21.41	5.19	27.4	92.0	1522.32	2.92
210	102	1.93	2.74	29.16	0.78	43.85								1522.53	2.90
210	104	1.90	2.78	32.32	0.88	46.70								1517.84	2.93
210	106	1.92	2.79	31.36	0.85	46.05								1516.29	2.88
210	108	1.91	2.79	31.70	0.86	46.31								1520.96	2.92
210	110	1.92	2.77	30.78	0.83	45.46	15.17	38.21	27.92	18.7	3.98	63.4	89.6	1518.05	2.90
210	112	1.93	2.75	29.89	0.80	44.56								1513.39	2.91
210	114	1.91	2.76	30.95	0.83	45.49								1516.70	2.92
210	116	1.89	2.80	34.07	0.93	48.22								1518.46	2.91
210	118	1.94	2.80	30.31	0.83	45.28								1509.17	2.85
210	120	1.93	2.78	30.32	0.82	45.19	12.5	34.26	29.43	23.81	4.95	32.4	90.5	1521.58	2.95
210	122	1.92	2.79	31.32	0.85	46.03								1520.02	2.94
210	124	1.94	2.76	28.95	0.78	43.80								1520.23	2.92
210	126	1.93	2.78	30.55	0.83	45.33								1522.94	2.96
210	128	1.94	2.78	29.58	0.80	44.52								1521.17	2.93
210	130	1.94	2.79	29.99	0.82	44.97	10.2	40.03	30.64	19.13	4.56	42.4	90.3	1513.18	2.94
210	132	1.92	2.77	30.76	0.83	45.39								1516.61	2.94
210	134	1.94	2.80	30.41	0.83	45.42								1508.87	2.90
210	136	1.94	2.78	29.37	0.80	44.33								1512.16	2.93
210	138	1.91	2.83	33.24	0.92	47.89								1516.40	2.95
210	140	1.89	2.77	32.98	0.89	47.15	13.77	42.92	25.1	18.12	4.03	61.2	91.6	1502.53	2.87
210	142	1.95	2.77	29.03	0.79	44.01								1502.73	2.84
210	144	1.92	2.79	31.13	0.85	45.92								1504.26	2.93
210	146	1.84	2.73	35.87	0.96	48.89								1508.87	2.90
210	148	1.90	2.76	31.74	0.85	46.07								1484.82	2.73
210	150	1.91	2.78	31.40	0.85	46.01	10.18	41.81	25.24	22.76	4.68	39.0	89.3	1480.36	2.81
210	152	1.95	2.76	28.08	0.76	43.05								1513.71	2.90
210	154	1.95	2.78	28.78	0.78	43.82								1520.46	2.97
210	156	1.96	2.77	28.10	0.76	43.21								1526.25	2.98
210	158	2.00	2.80	26.29	0.72	41.78								1529.62	3.00
210	160	1.97	2.77	27.40	0.74	42.57	7.77	43.13	26.71	22.38	5.29	25.6	91.0	1535.99	3.07
210	162	1.96	2.80	28.54	0.78	43.84								1552.16	3.06
210	164	1.97	2.77	27.48	0.74	42.60									
210	166	1.97	2.79	28.10	0.76	43.32								1558.72	3.07
210	168	1.97	2.76	27.28	0.74	42.37								1541.65	3.03
210	170	2.00	2.77	25.71	0.70	41.02	12.82	42.92	23.91	20.36	4.28	51.5	89.8	1538.08	3.03
210	172	1.97	2.80	28.29	0.77	43.62								1545.36	3.09
210	174	1.98	2.76	26.70	0.72	41.84								1539.34	3.03
210	176	1.95	2.76	28.37	0.77	43.35								1543.39	3.05
210	178	1.87	2.77	34.58	0.94	48.32								1541.84	3.01

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	%Carb	Vp (m/s)	IMP (kg/cm^2s)
210	180	1.86	2.77	34.95	0.95	48.60	7.14	44.61	24.77	23.48	5.23	26.6	89.9	1542.34	2.88
210	182	1.87	2.76	34.60	0.93	48.29									
210	184	1.91	2.77	31.66	0.86	46.12									
210	186	1.94	2.77	29.37	0.79	44.28	1.41	41.22	22.62	34.75	5.88	17.0	90.1	1584.82	3.02
														1578.51	3.06
213	0	1.68	2.74	52.74	1.41	58.49	0.03	13.25	65.86	20.85	6.45	11.4	88.4		
213	2	1.65	2.74	56.16	1.50	60.04									
213	4	1.66	2.74	55.64	1.49	59.85									
213	6	1.68	2.74	53.19	1.42	58.75									
213	8	1.73	2.74	46.65	1.25	55.51									
213	10	1.78	2.74	41.25	1.10	52.45	0.1	14.09	62.97	22.83	6.59	10.4	88.7		
213	12	1.80	2.74	39.22	1.05	51.21									
213	14	1.80	2.74	39.39	1.05	51.27									
213	16	1.78	2.74	41.21	1.10	52.42									
213	18	1.80	2.73	38.99	1.04	51.00									
213	20	1.79	2.74	40.59	1.08	52.03	0.32	15.31	60.34	24.03	6.7	9.6	89.1		
213	22	1.80	2.74	39.69	1.06	51.53								1512.57	2.72
213	24	1.80	2.74	39.62	1.06	51.51								1520.64	2.74
213	26	1.80	2.74	39.88	1.07	51.58								1513.18	2.72
213	28	1.81	2.74	39.05	1.04	51.08								1516.24	2.74
213	30	1.82	2.74	37.79	1.01	50.24	0.09	20.7	56.87	22.34	6.53	10.8	89.1	1514.91	2.76
213	32	1.79	2.74	40.25	1.08	51.83								1516.44	2.72
213	34	1.83	2.74	37.23	1.00	49.90								1524.34	2.78
213	36	1.83	2.74	37.23	1.00	49.93								1527.65	2.79
213	38	1.81	2.74	39.09	1.05	51.15								1518.78	2.74
213	40	1.84	2.74	36.16	0.97	49.20	0.71	31.02	49.77	18.5	5.58	20.9	90.1	1524.95	2.81
213	42	1.84	2.74	36.51	0.98	49.44								1517.65	2.79
213	44	1.82	2.74	37.81	1.01	50.30								1525.56	2.78
213	46	1.83	2.74	36.80	0.99	49.65								1525.77	2.80
213	48	1.84	2.75	36.78	0.99	49.69								1525.97	2.80
213	50	1.83	2.75	37.30	1.00	50.05	0.32	25.32	50.86	23.5	6.52	10.9	89.5	1523.08	2.79
213	52	1.82	2.75	38.40	1.03	50.76								1521.54	2.76
213	54	1.84	2.75	36.73	0.99	49.64								1526.38	2.80
213	56	1.84	2.75	36.39	0.98	49.39								1529.89	2.81
213	58	1.81	2.75	38.72	1.04	50.94								1526.78	2.77
213	60	1.83	2.75	36.98	0.99	49.83	0.72	31.28	45.71	22.29	6.2	13.6	85.4	1525.64	2.80
213	62	1.83	2.74	37.27	1.00	49.97								1522.55	2.78
213	64	1.84	2.74	35.88	0.96	48.99								1528.74	2.82
213	66	1.83	2.75	37.16	1.00	49.90								1522.76	2.79
213	68	1.82	2.75	38.47	1.03	50.81								1519.68	2.76
213	70	1.82	2.75	37.70	1.01	50.31	0.56	28.03	46.7	24.71	5.96	16.1	89.3	1524.50	2.78
213	72	1.84	2.76	36.92	0.99	49.85								1526.46	2.80
213	74	1.85	2.76	35.74	0.96	49.05								1532.67	2.84
213	76	1.86	2.76	35.25	0.95	48.70								1534.44	2.85
213	78	1.86	2.75	34.81	0.94	48.34									
213	80	1.91	2.75	30.74	0.83	45.26	1.99	29.81	43.92	24.27	6.45	11.4	89.0		
213	82	1.93	2.75	29.79	0.80	44.45									
213	84	1.86	2.75	35.04	0.94	48.49									
213	86	1.82	2.75	38.03	1.02	50.57									
213	88	1.88	2.75	33.11	0.89	47.10									
213	90	1.90	2.75	32.07	0.86	46.30	0.76	27.3	47.62	24.32	6.58	10.5	89.8		
213	92	1.89	2.76	32.90	0.89	46.97									
213	94	1.90	2.76	31.58	0.85	45.95									
213	96	1.86	2.76	34.84	0.94	48.42									
213	98	1.91	2.76	31.13	0.84	45.61									
213	100	1.92	2.75	30.56	0.82	45.12	0.71	35.43	40.81	23.04	6.01	15.5	89.9		
213	102	1.90	2.78	32.85	0.89	47.18									
213	104	1.87	2.76	34.00	0.92	47.85									
213	106	1.89	2.78	32.89	0.89	47.14									
213	108	1.87	2.76	34.06	0.92	47.83									
213	110	1.90	2.77	32.44	0.88	46.74	1.27	33.62	40.49	24.62	6.09	14.7	90.0	1524.36	2.89
213	112	1.93	2.75	29.64	0.80	44.30								1540.40	2.97
213	114	1.90	2.77	32.10	0.87	46.45								1527.09	2.90
213	116	1.89	2.75	32.11	0.86	46.31								1525.52	2.89
213	118	1.89	2.78	33.53	0.91	47.65								1521.03	2.87

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	%Carb	Vp (m/s)	IMP (kg/ cm^2s)
213	120	1.88	2.74	33.13	0.89	46.99	2.26	35.8	39.27	22.68	5.98	15.8	89.6	1516.37	2.85
213	122	1.89	2.74	31.92	0.85	46.09								517.72	2.87
213	124	1.88	2.80	34.43	0.94	48.53								1516.16	2.86
213	126	1.89	2.77	33.20	0.90	47.34								1523.95	2.88
213	128	1.91	2.75	31.11	0.83	45.50								1517.72	2.89
213	130	1.81	2.76	39.60	1.07	51.63	2.64	27.42	46.65	23.29	6.27	13.0	90.4	1497.59	2.71
213	132	1.78	2.76	42.24	1.14	53.23								1497.79	2.66
213	134	1.88	2.76	33.19	0.89	47.19								1514.62	2.85
213	136	1.88	2.79	34.59	0.94	48.55								1514.62	2.84
213	138	1.90	2.79	32.57	0.89	47.01								1522.59	2.90
213	140	1.89	2.76	32.38	0.87	46.61	5.55	37.58	34	22.88	5.81	17.8	90.1	1527.30	2.89
213	142	1.91												1519.48	2.89
213	144	1.90	2.76	31.90	0.86	46.23								1530.24	2.91
213	146	1.90	2.74	31.75	0.85	45.96								1523.95	2.89
213	148	1.91	2.76	31.38	0.85	45.86								1514.62	2.89
213	150	1.92	2.76	30.69	0.83	45.27	2.5	35.49	37.64	24.36	6.4	11.8		1523.95	2.92
213	152	1.91	2.78	31.62	0.86	46.16									
213	154	1.93	2.78	30.73	0.84	45.52								1527.30	2.94
213	156	1.89	2.75	32.44	0.87	46.52								1517.92	2.87
213	158	1.89	2.78	33.15	0.90	47.32								1521.03	2.87
213	160	1.91	2.79	32.35	0.88	46.85	6.64	38.57	32	22.79	5.75	18.6		1529.08	2.91
213	162	1.92	2.76	30.66	0.83	45.22								1525.93	2.92
213	164	1.96	2.76	27.80	0.75	42.82								1520.42	2.98
213	166	1.97	2.76	27.09	0.73	42.19								1537.97	3.03
213	168	1.94	2.77	29.29	0.79	44.19								1536.79	2.98
213	170	1.94	2.78	29.37	0.80	44.36	5.26	43.88	30.32	20.53	5.28	25.7		1538.80	2.99
213	172	1.96	2.75	27.74	0.74	42.68								1545.42	3.02
213	174	1.95	2.76	28.45	0.77	43.43									
213	176	2.04	2.77	23.08	0.62	38.42									
213	178	1.93	2.76	29.51	0.80	44.31									
213	180	1.96	2.78	28.61	0.78	43.72	9.62	47.4	24.7	18.28	4.41	47.0		1552.59	3.04
213	182	1.91	2.77	31.36	0.85	45.94									
213	184	1.93	2.79	30.73	0.84	45.61								1542.80	2.98
213	186	1.93	2.78	30.10	0.82	45.01								1534.86	2.97
213	188	1.95	2.78	28.82	0.78	43.93								1541.20	3.01
213	190	1.94	2.77	29.32	0.79	44.24	6.31	46.14	25.92	21.63	5.18	27.6		1538.23	2.99
213	192	1.91	2.76	31.47	0.85	45.90								1527.20	2.91
213	194	1.93	2.77	30.27	0.82	45.03								1530.34	2.95
213	196	1.94	2.77	29.42	0.80	44.29								1527.41	2.96
213	198	1.94	2.77	29.18	0.79	44.13								1548.02	3.01
213	200	1.90	2.79	32.76	0.89	47.17	3.37	42	28.02	26.61	6.16	14.0		1529.38	2.91
213	202	1.88	2.77	33.32	0.90	47.37								1529.05	2.88
213	204	1.93	2.76	29.59	0.80	44.38								1546.68	2.99
213	206	1.92	2.79	31.40	0.86	46.12								1537.33	2.95
213	208	1.93	2.77	29.73	0.80	44.57								1534.18	2.97
213	210	1.92	2.77	30.57	0.83	45.26	2.09	43.92	27.8	26.2	6.32	12.5		1532.60	2.95
213	212	1.88	2.77	33.22	0.90	47.29								1528.10	2.88
213	214	1.94	2.77	29.14	0.79	44.11								1539.33	2.99
213	216	1.94	2.77	29.48	0.80	44.36								1547.51	3.00
213	218	1.94	2.78	29.46	0.80	44.41								1539.75	2.99
213	220	1.92	2.77	30.45	0.82	45.17	2.48	35.19	30.64	31.69	6.96	8.0		1531.85	2.95
213	222	1.92	2.77	30.87	0.84	45.52								1539.95	2.96
213	224	1.96	2.76	27.99	0.75	43.02								1532.06	3.00
213	226	1.92	2.76	30.82	0.83	45.39								1538.57	2.95
213	228	1.95	2.77	28.55	0.77	43.58								1546.54	3.02
213	230	1.95	2.78	28.69	0.78	43.78	1.69	29.78	35.4	33.13	7.51	5.5		1544.94	3.02
213	232	1.93	2.75	29.32	0.79	44.08								1540.37	2.98
213	234	1.94	2.76	28.75	0.77	43.65								1535.82	2.99
213	236	1.96	2.76	27.82	0.75	42.81								1535.82	3.01
218	0	1.54	2.74	75.20		66.76	0.05	23.6	55.14	21.21	7.07	7.4			
218	2	1.74	2.75	45.56	1.22	55.00									
218	4	1.78	2.74	41.49	1.11	52.62									
218	6	1.78	2.74	41.27	1.11	52.51									
218	8	1.75	2.75	44.48	1.19	54.40									

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	%Carb	Vp (m/s)	IMP (kg/cm^2s)
218	10	1.86	2.75	35.04	0.94	48.45	0.53	31	47.47	21	6.25	13.1			
218	12	1.82	2.74	37.53	1.00	50.12									
218	14	1.84	2.74	36.54	0.98	49.45									
218	16	1.85	2.74	35.30	0.94	48.57								1487.56	2.73
218	18	1.85	2.73	34.81	0.93	48.16								1501.21	2.78
218	20	1.84	2.74	36.15	0.97	49.17	1.35	37.05	41.07	20.54	5.51	21.9		1505.82	2.79
218	22	1.87	2.75	33.54	0.90	47.35								1504.28	2.77
218	24	1.86	2.75	34.37	0.92	47.97								1505.82	2.82
218	26	1.88	2.74	32.94	0.88	46.88								1504.28	2.80
218	28	1.87	2.75	33.90	0.91	47.63								1508.50	2.84
218	30	1.89	2.75	32.23	0.87	46.41	1.68	41.82	37.92	18.57	5.17	27.8		1506.75	2.82
218	32	1.88	2.75	33.61	0.90	47.49								1513.15	2.86
218	34	1.89	2.75	32.56	0.87	46.61								1506.95	2.83
218	36	1.89	2.74	31.96	0.86	46.13								1511.80	2.85
218	38	1.92	2.75	30.18	0.81	44.78								1524.33	2.89
218	40	1.91	2.75	30.63	0.82	45.14	3.34	46.2	34.29	16.17	4.77	36.7		1528.12	2.94
218	42	1.91	2.76	31.02	0.84	45.51								1528.95	2.93
218	44	1.86	2.76	34.79	0.94	48.36								1527.99	2.92
218	46	1.89	2.76	32.52	0.88	46.67								1515.83	2.82
218	48	1.89	2.76	32.49	0.88	46.70								1519.37	2.87
218	50	1.90	2.76	32.15	0.87	46.42	2.62	40.91	34.71	21.76				1521.35	2.88
218	52	1.89	2.76	32.98	0.89	47.07								1521.56	2.89
218	54	1.89	2.76	32.81	0.88	46.95								1521.56	2.87
218	56	1.88	2.77	33.29	0.90	47.34								1517.27	2.87
218	58	1.89	2.76	32.99	0.89	47.06								1506.43	2.84
218	60	1.89	2.76	32.43	0.87	46.66	1.62	41.73	36.6	20.05	5.22	26.8		1520.40	2.87
218	62	1.88	2.76	33.82	0.91	47.73								1523.54	2.89
218	64	1.87	2.77	34.62	0.93	48.32								1521.76	2.86
218	66	1.91	2.76	31.02	0.84	45.57								1504.89	2.81
218	68	1.90	2.77	31.84	0.86	46.25								1517.27	2.90
218	70	1.88	2.77	33.28	0.90	47.35	0.82	38.46	39.09	21.63	5.65	19.9		1520.20	2.89
218	72	1.92	2.77	31.06	0.84	45.66								1518.22	2.86
218	74	1.91	2.79	32.04	0.87	46.58								1522.71	2.92
218	76	1.90	2.77	32.12	0.87	46.52								1525.45	2.91
218	78	1.92	2.76	30.62	0.83	45.25								1520.52	2.89
218	80	2.00	2.76	25.59	0.69	40.84	3.04	49.33	29.44	18.19	4.74	37.4		1526.20	2.93
218	82	1.95	2.77	28.70	0.78	43.73								1544.57	3.08
218	84	1.94	2.77	29.77	0.81	44.64								1531.72	2.99
218	86	1.95	2.77	28.59	0.77	43.61								1526.95	2.96
218	88	1.94	2.80	30.45	0.83	45.42								1525.79	2.98
218	90	1.97	2.78	28.02	0.76	43.22	9.63	46.01	25.31	19.05	4.51	43.9		1529.99	2.96
218	92	1.90	2.75	31.97	0.86	46.20								1540.21	3.03
218	94	1.92	2.75	30.16	0.81	44.79									
218	96	1.92	2.75	30.07	0.81	44.71									
218	98	1.88	2.77	33.77	0.91	47.71									
218	100	1.94	2.77	29.43	0.80	44.31	9.47	49.01	21.43	20.09	4.56	42.4		1543.17	2.99
218	102	1.92	2.78	30.77	0.84	45.53									
218	104	1.95	2.81	29.96	0.82	45.11								1539.62	3.00
218	106	1.96	2.77	27.87	0.75	42.99								1543.02	3.03
218	108	1.92	2.78	30.57	0.83	45.32								1529.77	2.94
218	110	1.91	2.77	31.28	0.85	45.84	6.26	47.57	25.79	20.36	4.78	36.4		1526.71	2.92
218	112	1.90	2.77	32.07	0.87	46.42								1532.04	2.91
218	114	1.90	2.76	32.24	0.87	46.50								1529.31	2.90
218	116	1.91	2.80	32.63	0.89	47.17								1537.61	2.93
218	118	1.89	2.78	33.60	0.91	47.74								1528.15	2.88
218	120	1.94	2.77	29.27	0.79	44.19	9.43	45.31	25.24	20.02	4.61	40.9		1537.82	2.99
218	122	1.94	2.79	29.73	0.81	44.74								1542.38	3.00
218	124	1.95	2.79	29.66	0.81	44.73								1533.41	2.98
218	126	1.95	2.80	29.53	0.81	44.70								1541.49	3.01
218	128	1.94	2.79	30.18	0.82	45.13								1522.88	2.95
218	130	1.95	2.77	28.49	0.77	43.53	3.54	42.84	29.33	24.3	5.45	22.9		1547.42	3.02
218	132	1.96	2.78	28.32	0.77	43.42								1556.73	3.05
218	134	1.98	2.78	27.01	0.73	42.30								1559.58	3.09
218	136	1.96	2.79	28.59	0.78	43.79								1547.99	3.03
218	138	1.98	2.78	26.90	0.73	42.22								1552.85	3.08

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	%Carb	Vp (m/s)	IMP (kg/ cm^2s)
218	140	1.94	2.78	29.42	0.80	44.40	1.11	35.96	33.01	29.92	6.77	9.2		1546.38	3.01
218	142	1.97	2.78	27.45	0.75	42.73								1547.99	3.06
218	144	1.98	2.81	27.40	0.75	42.88								1561.01	3.10
218	146	1.99	2.79	26.52	0.72	41.93								1552.85	3.09
218	148	1.99	2.77	26.21	0.71	41.51								1554.47	3.09
218	150	1.95	2.78	29.26	0.79	44.27	3.02	44.48	25.94	26.56	5.9	16.7		1564.72	3.04
220	0	1.55	2.66	70.03	1.82	64.48	0.14	16.10	62.69	21.07	6.02	15.4		1502.61	2.32
220	2	1.58	2.68	65.00	1.70	63.00								1513.10	2.39
220	4	1.61	2.70	60.34	1.59	61.37								1522.21	2.46
220	6	1.69	2.69	49.61	1.30	56.56								1520.68	2.57
220	8	1.73	2.70	45.31	1.19	54.42								1527.01	2.64
220	10	1.73	2.69	44.89	1.18	54.14	0.33	15.67	63.18	20.82	5.89	16.9		1537.84	2.66
220	12	1.76	2.71	42.26	1.12	52.78								1542.33	2.72
220	14	1.77	2.68	41.01	1.08	51.81								1540.56	2.72
220	16	1.77	2.70	40.97	1.08	51.95								1542.12	2.73
220	18	1.78	2.72	40.95	1.09	52.10								1537.43	2.74
220	20	1.75	2.72	43.88	1.16	53.80	0.37	22.54	56.49	20.59	5.74	18.7		1536.08	2.69
220	22	1.74	2.72	45.23	1.20	54.58								1537.64	2.67
220	24	1.79	2.73	40.52	1.08	51.89								1529.68	2.73
220	26	1.76	2.72	42.96	1.14	53.31								1526.00	2.69
220	28	1.79	2.72	39.95	1.06	51.48								1528.87	2.74
220	30	1.80	2.72	39.19	1.04	50.98	0.95	29.17	51.69	18.19	5.42	23.4		1529.61	2.75
220	32	1.80	2.71	38.97	1.03	50.78								1530.95	2.75
220	34	1.83	2.72	36.88	0.98	49.53								1530.14	2.79
220	36	1.80	2.72	38.62	1.03	50.66								1533.98	2.77
220	38	1.86	2.73	34.39	0.92	47.79								1529.86	2.84
220	40	1.87	2.73	33.15	0.88	46.92	2.02	33.31	47.90	16.76	5.09	29.4		1538.59	2.88
220	42	1.84	2.73	35.84	0.95	48.84								1543.10	2.84
220	44	1.81	2.73	38.63	1.03	50.71								1541.12	2.78
220	46	1.82	2.72	36.67	0.97	49.31								1536.01	2.80
220	48	1.84	2.72	35.85	0.95	48.80								1534.65	2.82
220	50	1.89	2.73	31.47	0.84	45.60	3.96	29.88	47.20	18.96	5.31	25.2		1531.54	2.90
220	52	1.87	2.73	32.91	0.88	46.72								1544.06	2.89
220	54	1.84	2.72	35.52	0.95	48.59								1539.34	
220	56	1.83	2.73	36.27	0.97	49.15									
220	58	1.84	2.73	35.63	0.95	48.70								1548.61	2.85
220	60	1.85	2.72	35.15	0.93	48.32	2.94	32.88	44.82	19.36	5.28	25.7		1545.44	2.85
220	62	1.82	2.71	36.98	0.98	49.50								1547.23	2.82
220	64	1.80	2.73	39.60	1.06	51.36								1545.64	2.78
220	66	1.82	2.73	37.84	1.01	50.23								1536.21	2.79
220	68	1.86	2.72	34.22	0.91	47.61								1537.78	2.85
220	70	1.84	2.73	35.91	0.96	48.89	4.52	41.20	38.94	15.35	4.56	42.4		1540.71	2.83
220	72	1.88	2.73	32.38	0.86	46.36								1543.86	2.91
220	74	1.85	2.73	34.69	0.92	48.05								1547.23	2.87
220	76	1.87	2.73	33.25	0.89	46.96								1549.63	2.90
220	78	1.85	2.74	35.28	0.94	48.53								1548.66	2.86
220	80	1.87	2.74	33.75	0.90	47.43	4.52	33.64	41.96	19.85	5.41	23.5		1552.25	2.90
220	82	1.92	2.73	29.79	0.79	44.23								1552.66	2.98
220	84	1.84	2.74	36.23	0.97	49.23								1557.67	2.86
220	86	1.97	2.76	26.97	0.73	42.07								1565.35	
220	88	1.96	2.73	31.34	0.84	45.53									
220	90	1.90	2.73	26.83	0.72	41.73	3.39	39.39	39.22	18.01	4.95	32.4			
220	92	1.96	2.73	28.18	0.75	42.92									
220	94	1.94	2.73	29.89	0.80	44.37									
220	96	1.92	2.74	28.49	0.76	43.28									
220	98	1.94	2.73	27.82	0.74	42.59									
220	100	1.95	2.73	29.54	0.79	44.07	5.83	39.07	37.15	17.95	4.76	36.9			
220	102	1.92	2.75	26.79	0.72	41.86									
220	104	1.97	2.74	30.12	0.81	44.66									
220	106	1.92	2.78	28.71	0.78	43.82									
220	108	1.95	2.77	28.78	0.78	43.79									
220	110	1.95	2.74	28.23	0.76	43.03									
220	112	1.94	2.76	26.88	0.72	41.96									
220	114	1.97	2.79	27.88	0.76	43.18									

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	% Carb	Vp (m/s)	IMP (kg/cm^2s)
220	116	1.97	2.76	29.12	0.79	43.98									
220	118	1.94	2.81	27.99	0.77	43.43									
220	120	1.98	2.74	28.17	0.75	42.98	4.66	43.98	36.63	14.74	4.19	54.8			
220	122	1.95	2.77	24.96	0.68	40.33									
220	124	2.01	2.82	28.30	0.78	43.79									
220	126	1.98	2.77	27.05	0.73	42.27									
220	128	1.98	2.78	24.70	0.67	40.14									
220	130	2.02	2.76	25.76	0.69	40.98	13.51	54.44	19.38	12.66	3.05	120.7			
220	132	1.99	2.79	26.46	0.72	41.92									
220	134	1.99	2.78	25.19	0.68	40.61									
220	136	2.01	2.81	26.58	0.73	42.14									
220	138	2.00	2.78	26.25	0.71	41.63									
220	140	1.99	2.75	24.46	0.66	39.64	8.14	49.91	23.96	17.99	4.20	54.4			
220	142	2.01	2.81	26.90	0.74	42.43									
220	144	1.99	2.77	26.88	0.73	42.10									
220	146	1.98	2.79	25.02	0.68	40.50									
220	148	2.02	2.77	27.72	0.75	42.88									
220	150	1.97	2.74	26.47	0.71	41.46	16.96	42.85	24.46	15.73	2.98	126.7			
220	152	1.97	2.76	26.92	0.72	42.01									
220	154	1.97	2.76	27.53	0.74	42.60									
220	156	1.96	2.77	28.06	0.76	43.14									
220	158	1.96	2.77	26.88	0.73	42.11									
220	160	1.98	2.75	27.33	0.73	42.33	11.37	42.90	25.98	19.75	4.46	45.4			
220	162	1.96	2.75	25.77	0.69	40.94									
220	164	1.99	2.77	26.70	0.72	41.95									
220	166	1.98	2.75	27.30	0.73	42.33									
220	168	1.96	2.80	26.34	0.72	41.88									
220	170	2.00	2.75	26.72	0.72	41.78	3.99	43.13	27.98	24.89	5.72	19.0			
220	172	1.97	2.76	26.53	0.71	41.66									
220	174	1.98	2.79	25.60	0.70	41.12									
220	176	2.01	2.77	24.86	0.67	40.19									
220	178	2.01	2.82	28.17	0.78	43.72									
220	180	1.98	2.76	28.54	0.77	43.48	3.64	39.16	30.29	26.92	6.67	9.8		1519.61	3.01
220	182	1.95	2.77	30.47	0.82	45.16								1518.65	2.96
220	184	2.05	2.77	33.71	0.91	47.68								1523.83	
220	186	2.09	2.77	35.04	0.95	48.67									
220	188	1.92	2.76	33.42	0.90	47.40								1529.22	2.94
220	190	1.88	2.76	30.26	0.82	44.92	2.71	32.19	28.03	37.07	6.74	9.4			
220	192	1.86	2.79	30.08	0.82	45.08								1526.33	2.84
220	194	1.88	2.77	29.29	0.79	44.21								1525.50	
220	196	1.92	2.81	31.93	0.87	46.65									
220	198	1.94	2.77	31.91	0.86	46.34								1537.83	
220	200	1.94	2.77	30.28	0.82	45.03	2.67	30.68	36.68	29.97	6.43	11.6			
220	202	1.92	2.77	31.76	0.86	46.21								1566.10	3.00
220	204	1.90	2.79	34.46	0.94	48.44								1561.04	2.97
220	206	1.93	2.74	32.78	0.88	46.69								1559.43	3.00
220	208	1.91	2.77	33.41	0.90	47.49								1562.65	2.98
220	210	1.88	2.75	37.45	1.01	50.14	6.88	26.32	31.15	35.65	7.41	5.9		1559.43	2.93
220	212	1.88	2.75	35.15	0.95	48.59								1559.43	2.93
220	214	1.88	2.80	35.90	0.98	49.51								1545.07	2.91
220	216	1.83	2.76	33.79	0.91	47.64								1540.35	2.82
220	218	1.86	2.72	38.46	1.02	50.56								1540.55	2.86
220	220	1.86	2.74	44.09	1.18	54.13	1.70	18.27	38.64	41.39	9.20	1.7		1523.47	2.84
220	222	1.87	2.74	43.86	1.17	54.02								1523.87	2.86
220	224	1.81	2.80	43.30	1.18	54.18								1531.80	2.77
220	226	1.75	2.75	42.60	1.14	53.33								1540.01	2.70
220	228	1.76	2.75	42.41	1.14	53.26									
220	230	1.78	2.75	74.32	2.00	66.62	2.04	23.08	34.20	4.68	7.00	7.8			
220	232	1.77	2.76	44.52	1.20	54.54									
222	0	1.71	2.70	47.16	1.24	55.39	0	12.31	66.48	21.21	6.34	12.3	90.6		
222	2	1.71	2.70	48.09	1.27	55.88									
222	4	1.76	2.73	42.95	1.15	53.42									
222	6	1.74	2.69	44.37	1.17	53.83									
222	8	1.75	2.73	44.33	1.18	54.19									

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	%Carb	Vp (m/s)	IMP (kg/cm^2s)
222	10	1.77	2.73	42.10	1.12	52.90	0.17	14.69	63.23	21.92	6.29	12.8	91.8		
222	12	1.76	2.71	42.98	1.14	53.23									
222	14	1.78	2.71	40.70	1.08	51.82									
222	16	1.82	2.70	36.21	0.96	48.86									
222	18	1.81	2.69	36.92	0.97	49.28									
222	20	1.83	2.72	35.97	0.96	48.85	0.69	16.02	60.17	23.12	6.43	11.6	93.1		
222	22	1.81	2.71	37.39	0.99	49.70									
222	24	1.77	2.76	43.37	1.17	53.89									
222	26	1.76	2.74	43.31	1.16	53.67									
222	28	1.79	2.75	40.82	1.10	52.31									
222	30	1.83	2.72	36.57	0.97	49.23	1.86	20.68	56.62	20.84	5.99	15.7	92.2		
222	32	1.86	2.79	36.11	0.98	49.57									
222	34	1.91	2.70	29.53	0.78	43.80									
222	36	1.87	2.69	32.10	0.84	45.77									
222	38	1.89	2.75	32.18	0.86	46.33									
222	40	1.91	2.77	31.33	0.85	45.87	0.85	23.68	54.04	21.44	6.05	15.1	92.1		
222	42	1.87	2.80	35.12	0.96	49.01									
222	44	1.9	2.75	32.00	0.86	46.22									
222	46	1.89	2.74	32.00	0.86	46.13									
222	48	1.89	2.77	32.73	0.88	46.94									
222	50	1.9	2.70	30.39	0.80	44.45	1.09	18.43	55.69	24.79	6.62	10.2	92.7		
222	52	1.91	2.73	30.46	0.81	44.85									
222	54	1.9	2.70	30.12	0.79	44.26									
222	56	1.9	2.81	33.12	0.91	47.57									
222	58	1.89	2.73	31.72	0.85	45.85									
222	60	1.89	2.79	33.20	0.90	47.48	1.07	21.7	39.43	37.8	5.92	16.5	92.5		
222	62	1.89	2.77	32.48	0.88	46.74									
222	64	1.9	2.71	30.57	0.81	44.76									
222	66	1.9	2.71	30.70	0.81	44.84									
222	68	1.88	2.71	32.35	0.86	46.16									
222	70	1.9	2.74	31.03	0.83	45.33	1	22.63	52.81	23.56	6.54	10.7	93.5		
222	72	1.89	2.71	31.17	0.82	45.18									
222	74	1.92	2.71	28.99	0.77	43.39									
222	76	1.9	2.73	30.81	0.82	45.09									
222	78	1.9	2.72	31.15	0.83	45.29									
222	80	1.9	2.73	31.53	0.84	45.70	1.17	22.16	51.82	24.85	6.96	8.0	93.5		
222	82	1.91	2.72	29.66	0.79	44.02									
222	84	1.92	2.78	30.98	0.84	45.65									
222	86	1.89	2.70	30.84	0.81	44.89									
222	88	1.91	2.75	30.64	0.82	45.16									
222	90	2	2.73	24.71	0.66	39.73	5.13	28.16	45.08	21.63	5.9	16.7	91.1		
222	92	1.89	2.76	32.90	0.89	47.03									
222	94	1.86	2.72	34.07	0.90	47.46									
222	96	1.89	2.75	32.78	0.88	46.83									
222	98	1.87	2.72	32.97	0.88	46.73									
222	100	1.89	2.73	31.85	0.85	45.89	1.34	28.37	46.81	23.48	6.07	14.9	92.7		
222	102	1.89	2.74	31.80	0.85	45.99									
222	104	1.89	2.77	32.76	0.89	47.00									
222	106	1.89	2.74	32.02	0.86	46.09									
222	108	1.88	2.76	33.55	0.90	47.49									
222	110	1.9	2.73	31.25	0.83	45.42	2.03	24.14	47.48	26.35	6.71	9.6	92.2		
222	112	1.87	2.79	35.08	0.95	48.82									
222	114	1.86	2.77	35.24	0.95	48.80									
222	116	1.9	2.75	31.69	0.85	46.00									
222	118	1.89	2.79	33.03	0.90	47.32									
222	120	1.88	2.73	32.82	0.87	46.63	5.59	31.55	40.82	22.04	5.92	16.5	96.3		
222	122	1.88	2.74	32.67	0.87	46.61									
222	124	1.89	2.79	33.12	0.90	47.41									
222	126	1.91	2.75	31.27	0.84	45.67									
222	128	1.89	2.75	32.50	0.87	46.63								1503.25	2.87
222	130	1.94	2.73	28.46	0.76	43.14								1506.34	2.85
222	132	1.92	2.76	30.56	0.82	45.12	3.49	31.06	33.9	31.56	5.9	16.7	93.4	1520.59	2.95
222	134	1.93	2.78	30.28	0.82	45.11								1515.47	2.91
222	136	1.9	2.78	32.82	0.89	47.11								1522.92	2.94
222	138	1.92	2.79	31.44	0.86	46.16								1516.62	2.88
														1507.27	2.89

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	%Carb	Vp (m/s)	IMP (kg/ cm^2s)
222	140	1.91	2.79	31.82	0.87	46.46	7.02	33.36	38.16	21.46	5.62	20.3	89.8	1510.37	2.88
222	142	1.91	2.77	31.32	0.85	45.85								1515.26	2.89
222	144	1.91	2.77	31.30	0.85	45.86								1513.29	2.89
222	146	1.9	2.79	32.58	0.89	47.06								1514.85	2.88
222	148	1.91	2.79	32.05	0.87	46.65								1520.93	2.90
222	150	1.87	2.79	34.82	0.95	48.67	8.78	36.68	35.13	19.41	4.81	35.6	93.2	1512.05	2.83
222	152	1.89	2.77	32.71	0.88	46.91								1508.32	2.85
222	154	1.91	2.79	32.12	0.87	46.66								1503.26	2.87
222	156	1.95	2.76	28.56	0.77	43.50								1501.72	2.93
222	158	1.96	2.78	28.53	0.77	43.65								1526.78	2.99
222	160	1.95	2.78	29.17	0.79	44.17	12.96	30.95	32.73	23.37	5.6	20.6	93.3	1524.98	2.97
222	162	1.93	2.80	30.91	0.84	45.77								1535.34	2.96
222	164	1.92	2.78	30.87	0.84	45.60								1532.13	2.94
222	166	1.92	2.80	31.60	0.86	46.33								1522.56	2.92
222	168	1.93	2.81	30.93	0.85	45.87								1376.42	2.66
222	170	1.91	2.74	30.92	0.83	45.30	10.36	28.58	38.11	22.96	5.64	20.1	95.1	1538.57	2.94
222	172	1.96	2.78	28.40	0.77	43.57								1522.56	2.98
222	174	1.9												1526.15	2.90
222	176	1.93	2.75	29.74	0.80	44.44								1531.57	2.96
222	178	1.94	2.78	29.95	0.81	44.84								1512.46	2.93
222	180	1.97	2.74	26.62	0.71	41.60	2.59	35.56	34.17	27.69	6.31	12.6	90.1	1527.47	3.01
222	182	1.97	2.80	28.23	0.77	43.52								1534.49	3.02
222	184	1.91	2.80	32.25	0.88	46.82								1540.79	2.94
222	186	2.01												1542.46	3.10
222	188	2.04	2.80	24.03	0.66	39.63									
222	190	1.91	2.79	32.03	0.87	46.58	1.85	38.19	31.93	28.02	6.27	13.0	90.5	1509.67	2.88
222	192	1.85													
222	194	1.92	2.76	30.72	0.83	45.28									
222	196	1.88	2.81	34.80	0.96	48.86									
222	198	1.84	2.76	36.17	0.97	49.33									
222	200	1.87	2.78	34.98	0.95	48.69	1.93	27.69	37.21	33.17	7.52	5.4	90.9	1551.64	2.86
222	202	1.88	2.81	35.06	0.96	49.07								1541.60	2.88
222	204	1.89	2.82	34.27	0.94	48.54								1544.80	2.90
222	206	1.86	2.82	36.91	1.02	50.41								1544.80	2.92
222	208	1.86	2.79	36.16	0.99	49.65								1528.76	2.84
222	210	1.87	2.77	34.49	0.93	48.26	0.8	22.37	39.77	37.07	7.83	4.4	88.7	1528.15	2.84
222	212	1.88	2.78	33.51	0.91	47.59								1521.29	2.84
222	214	1.92	2.83	32.46	0.90	47.29								1520.68	2.86
222	216	1.92	2.75	30.05	0.81	44.66								1525.36	2.93
222	218	1.87	2.76	33.99	0.92	47.83								1533.00	2.94
222	220	1.85	2.77	36.08	0.97	49.35	2.2	24.86	36.6	36.34	7.61	5.1	86.6	1538.72	2.88
222	222	1.84	2.77	36.73	0.99	49.85								1545.11	2.86
222	224	1.81	2.83	41.65	1.15	53.47								1518.12	2.79
222	226	1.84	2.75	36.21	0.97	49.32								1513.28	2.74
222	228	1.83	2.75	36.87	0.99	49.77								1512.88	2.78
222	230	1.86	2.73	33.92	0.90	47.45	0.44	19.69	40.74	39.13	7.89	4.2	88.7	1503.10	2.75
222	232	1.81	2.77	39.43	1.07	51.65								1499.67	2.79
222	234	1.79	2.79	42.41	1.16	53.63								1503.81	2.72
222	236	1.82	2.76	38.79	1.05	51.13								1509.72	2.70
222	238	1.81	2.74	38.43	1.03	50.66								1496.05	2.72
222	240	1.6	2.74	63.30	1.69	62.88	0.12	16.53	42.74	40.61	8.13	3.6	85.9	1488.55	2.69
														1499.06	2.40
224	0	1.71	2.73	48.29	1.29	56.32	0.18	27.37	52.8	19.65	5.73	18.8	92.8		
224	2	1.75	2.76	45.52	1.23	55.10									
224	4	1.71	2.80	50.19	1.37	57.81									
224	6	1.71	2.75	48.88	1.31	56.80									
224	8	1.74	2.75	45.83	1.23	55.20									
224	10	1.73	2.73	46.23	1.23	55.23	0.5	21.1	54.84	23.55	6.29	12.8	94.0		
224	12	1.75	2.76	45.46	1.22	55.05									
224	14	1.74	2.72	45.28	1.20	54.62									
224	16	1.75	2.75	44.44	1.19	54.39									
224	18	1.78	2.75	42.19	1.13	53.09									
224	20	1.78	2.74	41.74	1.12	52.80	0.81	32.31	46.71	20.16	5.68	19.5	92.4		
224	22	1.78	2.76	42.15	1.14	53.17									
224	24	1.80	2.76	40.19	1.08	51.97									

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	%Carb	Vp (m/s)	IMP (kg/cm^2s)
224	26	1.81	2.76	39.62	1.07	51.67									
224	28	1.81	2.82	40.76	1.12	52.87								1564.14	2.83
224	30	1.83	2.78	37.66	1.02	50.54								1578.82	2.86
224	32	1.85	2.78	36.37	0.99	49.68	1.59	42	38.4	18.01	5.2	27.2	92.9	1579.90	2.90
224	34	1.82	2.75	37.82	1.01	50.37								1582.57	2.93
224	36	1.82	2.80	39.26	1.07	51.77								1576.82	2.87
224	38	1.82	2.75	38.30	1.03	50.70								1580.31	2.88
224	40	1.83	2.76	37.27	1.00	50.12								1578.88	2.87
224	42	1.79	2.74	40.08	1.07	51.73	1.18	38.78	40.79	19.25	5.44	23.0	92.5	1572.74	2.88
224	44	1.79	2.75	40.36	1.08	51.99								1566.46	2.81
224	46	1.81	2.75	39.19	1.05	51.25								1561.62	2.80
224	48	1.81	2.75	38.84	1.04	51.06								1557.02	2.81
224	50	1.81	2.76	38.82	1.05	51.11								1568.49	2.84
224	52	1.82	2.72	36.94	0.98	49.55	1.39	43.59	36.02	19	5.21	27.0	93.2	1560.43	2.83
224	54	1.82	2.75	37.83	1.01	50.37								1563.64	2.85
224	56	1.83	2.74	36.90	0.99	49.64								1560.43	2.84
224	58	1.81	2.74	38.76	1.04	50.88								1566.66	2.87
224	60	1.83	2.73	36.75	0.98	49.52								1563.23	2.83
224	62	1.82	2.71	36.61	0.97	49.22	2.83	43.81	33.39	19.97	5.34	24.7	92.5	1564.84	2.86
224	64	1.82	2.70	37.05	0.98	49.43								1561.62	2.85
224	66	1.80	2.73	39.45	1.05	51.28								1565.05	2.84
224	68	1.83	2.71	36.38	0.96	49.09								1558.62	2.80
224	70	1.83	2.73	37.03	0.99	49.67								1560.22	2.85
224	72	1.83	2.80	38.42	1.05	51.25	3.78	41.92	35.93	18.37	5.15	28.2	91.2	1566.66	2.86
224	74	1.83	2.75	37.31	1.00	50.03								1571.32	2.88
224	76	1.82	2.71	36.64	0.97	49.26								1564.63	2.86
224	78	1.82	2.77	38.28	1.03	50.83								1562.82	2.85
224	80	1.82	2.76	38.36	1.04	50.87								1566.04	2.86
224	82	1.85	2.75	35.98	0.97	49.17	4.27	45.39	31.75	18.59	5.04	30.4	88.6	1567.45	2.86
224	84	1.83	2.75	37.62	1.01	50.29								1570.70	2.90
224	86	1.83	2.78	38.36	1.04	50.97								1564.22	2.86
224	88	1.86	2.78	35.78	0.97	49.30								1564.01	2.86
224	90	1.84	2.77	36.77	0.99	49.83								1573.13	2.92
224	92	1.91	2.76	31.32	0.84	45.78	4.86	46.73	29.62	18.78	4.79	36.1	92.4		
224	94	2.00	2.78												
224	96	1.90	2.76												
224	98	1.88	2.76	34.67	0.96	49.11	5.94	48.65	27.01	18.4	4.59	41.5	89.6		
224	100	1.90	2.79	34.75	0.97	49.16									
224	102	1.91	2.83	36.32	1.01	50.27									
224	104	1.91	2.77	34.06	0.95	48.67									
224	106	1.90	2.77	31.46	0.85	46.01								1551.90	2.96
224	108	1.88	2.80	33.96	0.95	48.59	4.95	46.29	31.89	16.87	4.74	37.4	91.5	1543.87	2.93
224	110	1.93	2.79	34.73	0.97	49.15								1542.27	2.90
224	112	1.93	2.83	35.78	1.00	49.89								1545.47	2.98
224	114	1.92	2.77	32.54	0.91	47.52								1546.86	2.99
224	116	1.91	2.81	31.20	0.86	46.15								1554.92	2.98
224	118	1.85	2.79	32.98	0.92	47.86	36.68	32.58	17.19	13.55	2.22	214.6		1550.08	2.96
224	120	1.48	2.79	33.39	0.93	48.17								1553.31	2.88
224	122	1.79	2.77	38.17	1.06	51.51									
224	124	1.85	2.76												
224	126	1.85	2.79	41.65	1.13	53.12									
224	128	1.89	2.82	37.91	1.08	51.08	11.73	43.33	28.91	16.02	3.71	76.4	91.7		
224	130	1.91	2.78	36.26	1.06	49.63									
224	132	1.92	2.77	32.86	0.98	47.04									
224	134	1.95	2.78	31.61	0.93	46.16									
224	136	1.91	2.80	31.52	0.86	46.27									
224	138	1.89	2.77	28.63	0.85	43.68	5.6	33.77	33.63	26.99	7.04	7.6	91.7		
224	140	1.91	2.82	32.50	0.93	47.23								1568.73	2.96
224	142	1.99	2.76	32.77	0.98	46.92								1556.45	2.97
224	144	1.82	2.78	31.89	0.94	46.42									
											5.08	29.6		1549.60	2.82
225	0	1.81	2.71	37.70	1.00	49.94									
225	2	1.78	2.72	40.55	1.08	51.84	0.04	31.01	47.77	21.18	5.95	16.2		1484.48	2.69
225	4	1.82	2.73	37.70	1.00	50.12								1483.18	2.64
225	6	1.82	2.71	37.16	0.98	49.61								1480.18	2.69
														1480.79	2.69

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	%Carb	Vp (m/s)	IMP (kg/cm^2s)
225	8	1.87	2.73	33.66	0.90	47.30									
225	10	1.85	2.71	34.62	0.92	47.79	1.79	26.62	49.28	22.31	6.16	14.0		1476.92	2.76
225	12	1.85	2.73	35.25	0.94	48.44								1485.01	2.74
225	14	1.85	2.79	36.90	1.01	50.13								1483.71	2.74
225	16	1.87	2.72	32.61	0.86	46.38								1483.91	2.74
225	18	1.84	2.71	35.49	0.94	48.42								1477.93	2.77
225	20	1.87	2.71	32.88	0.87	46.54	0.59	30.32	45.17	23.92	6.17	13.9		1480.92	2.72
225	22	1.87	2.72	33.16	0.88	46.83								1475.16	2.76
225	24	1.90	2.73	31.19	0.83	45.43								1481.12	2.77
225	26	1.90	2.72	30.60	0.81	44.83								1485.62	2.82
225	28	1.90	2.84	34.40	0.95	48.82								1484.32	2.82
225	30	1.88	2.73	32.38	0.86	46.36	2.42	40.75	36.69	20.14	5.57	21.1		1488.84	2.82
225	32	1.90	2.83	33.84	0.94	48.36								1491.87	2.81
225	34	1.90	2.74	31.16	0.83	45.48								1489.05	2.83
225	36	1.90	2.75	31.39	0.84	45.74								1484.52	2.83
225	38	1.95	2.74	27.90	0.75	42.70								1498.38	2.85
225	40	1.92	2.77	30.85	0.83	45.48	3.31	43.24	34.24	19.22	5.52	21.8		1502.67	2.93
225	42	1.89	2.79	34.01	0.93	48.14								1501.12	2.88
225	44	1.91	2.74	30.81	0.83	45.24								1497.13	2.82
225	46	1.95	2.75	28.39	0.76	43.30								1486.68	2.84
225	48	1.90	2.76	31.55	0.85	45.92								1490.12	2.90
225	50	1.91	2.76	31.43	0.85	45.89	2.40	46.07	31.19	20.34	5.45	22.9		1501.44	2.86
225	52	1.90	2.76	32.05	0.86	46.31								1492.46	2.85
225	54	1.90	2.79	32.45	0.88	46.93								1493.98	2.83
225	56	1.91	2.74	30.75	0.82	45.10								1492.46	2.84
225	58	1.90	2.81	33.62	0.92	48.03								1494.18	2.85
225	60	1.89	2.75	32.37	0.87	46.52	2.27	43.73	32.35	21.64	5.48	22.4		1492.66	2.83
225	62	1.91	2.82	32.83	0.91	47.51								1486.60	2.81
225	64	1.90	2.77	32.23	0.87	46.58								1491.35	2.85
225	66	1.91	2.74	30.82	0.83	45.21								1495.92	2.84
225	68	1.95	2.75	28.03	0.75	42.98								1494.59	2.85
225	70	1.90	2.78	32.27	0.88	46.73	4.79	43.72	29.98	21.51	5.30	25.4		1494.59	2.92
225	72	1.92	2.74	29.76	0.80	44.37								1497.65	2.85
225	74	1.92	2.78	31.25	0.85	45.90								1496.12	2.88
225	76	1.94	2.77	29.73	0.81	44.60								1497.65	2.87
225	78	1.93	2.76	27.67	0.75	42.71								1493.98	2.89
225	80	1.96	2.75	27.34	0.73	42.32	2.67	44.57	33.27	19.49	5.11	29.0		1501.64	2.89
225	82	1.96	2.78	27.67	0.75	42.92								1498.36	2.94
225	84	1.97	2.74	30.29	0.81	44.74								1503.90	2.95
225	86	1.91	2.81	23.53	0.64	39.19								1505.24	2.97
225	88	2.05	2.75	22.30	0.60	37.43								1509.90	2.89
225	90	2.04	2.77	31.05	0.84	45.65	6.31	47.66	28.78	17.25	4.55	42.7			
225	92	1.96	2.76	27.85	0.75	42.87									
225	94	1.92	2.79	26.41	0.72	41.84									
225	96	1.99	2.80	28.63	0.78	43.89									
225	98	1.99	2.75	27.12	0.73	42.10	6.93	47.14	28.19	17.75	4.50	44.2			
225	100	1.96	2.77	26.42	0.71	41.65								1505.34	2.95
225	102	1.96	2.82	28.50	0.78	43.96								1504.61	2.95
225	104	1.98	2.81	27.60	0.76	43.12								1510.01	3.00
225	106	1.97	2.82	27.15	0.75	42.75								1513.35	2.99
225	108	1.98	2.80	26.38	0.72	41.87	3.21	45.27	30.24	21.28	5.42	23.4		1508.66	2.99
225	110	1.99	2.75	25.73	0.69	40.88								1507.83	3.01
225	112	2.00	2.80	27.70	0.76	43.13								1508.35	3.01
225	114	1.98	2.78	26.79	0.73	42.14								1507.52	2.98
225	116	1.99	2.86	28.24	0.79	44.06								1516.51	3.02
225	118	1.99	2.77	25.86	0.70	41.12	5.03	46.09	28.55	20.33	5.08	29.6		1512.32	3.01
225	120	1.99	2.78	25.53	0.69	40.97								1501.29	2.99
225	122	2.01	2.79	25.79	0.70	41.31								1505.96	3.02
225	124	2.01	2.77	25.73	0.70	41.06								1512.23	3.03
225	126	2.00	2.79	25.20	0.69	40.74								1505.96	3.01
225	128	2.02	2.82	25.84	0.71	41.61	4.20	43.99	33.72	18.10	5.06	30.0		1506.58	3.04
225	130	2.02	2.78	23.33	0.63	38.79								1504.28	3.04
225	132	2.04	2.77	24.10	0.65	39.50								1489.61	3.04
225	134	2.03	2.76	23.56	0.64	38.87								1494.64	3.03
225	136	2.03	2.78	24.24	0.66	39.66								1506.38	3.06

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	%Carb	Vp (m/s)	IMP (kg/cm^2s)
225	138	2.02	2.79	24.78	0.68	40.32	4.14	34.16	30.68	31.03	6.49	11.1			
225	140	2.02	2.78	24.52	0.66	39.93								1511.52	3.06
225	142	2.02	2.82	26.72	0.73	42.35								1512.35	3.06
225	144	2.00	2.82	26.18	0.72	41.87								1512.98	3.06
225	146	2.01	2.81	27.38	0.75	42.91								1518.16	3.04
225	148	1.99	2.75	26.09	0.70	41.21	3.67	38.24	30.45	27.64	6.32	12.5		1512.66	3.04
225	150	1.98	2.77	27.59	0.75	42.73								1512.34	3.00
225	152	1.97	2.75	26.57	0.71	41.66								1501.50	2.98
225	154	1.98	2.77	27.09	0.73	42.32								1499.02	2.95
225	156	1.98	2.78	23.85	0.65	39.29								1499.85	2.96
225	158	2.03	2.76	24.51	0.66	39.77	3.76	41.42	26.29	28.53	6.48	11.2		1498.72	2.96
225	160	2.01	2.77	27.00	0.73	42.21								1496.46	3.04
225	162	1.98	2.76	27.03	0.73	42.18								1495.96	3.01
225	164	1.97	2.80	30.92	0.85	45.83								1506.27	2.98
225	166	1.93	2.76	31.40	0.85	45.87								1513.36	2.99
225	168	1.91	2.79	30.80	0.84	45.61	2.33	29.37	33.80	34.50	7.44	5.8		1522.51	2.94
225	170	1.93	2.76	29.61	0.80	44.39								1505.34	2.87
225	172	1.93	2.76	27.88	0.75	42.89								1509.90	2.91
225	174	1.96	2.80	29.60	0.81	44.71								1486.59	2.87
225	176	1.95	2.78	31.71	0.86	46.28								1486.10	2.91
225	178	1.91	2.82	33.23	0.91	47.77	1.57	24.59	35.93	37.91	7.73	4.7		1501.03	2.93
225	180	1.90	2.75	28.62	0.77	43.44								1500.31	2.87
225	182	1.94	2.78	29.36	0.80	44.32								1508.65	2.87
225	184	1.94	2.74	27.09	0.73	42.03								1504.83	2.92
225	186	1.96	2.73											1495.95	2.91
225	188	1.80	2.78	39.78	1.07	51.63		19.46	41.93	37.76	7.95	4.0		1492.01	2.93
225	190	1.77	2.75	43.99	1.20	54.47									
225	192	1.80	2.79	38.81	1.03	50.80								1549.73	2.74
225	194	1.87	2.72	33.44	0.89	47.22									
225	196	1.88	2.74	32.96	0.88	46.94								1485.32	2.78
225	198	1.82	2.75	38.14	1.03	50.73	0.92	12.26	45.73	41.09	8.18	3.4		1479.73	2.78
225	200	1.79	2.76	40.95	1.10	52.39								1519.14	2.77
225	202	1.83	2.75	37.83	1.03	50.64								1551.79	2.78
225	204	1.85	2.78	35.02	0.94	48.37								1554.98	2.85
225	206	1.27	2.74											1536.07	2.85
225	208	1.07	2.74											1520.86	1.93
225	210	1.75	2.76				4.83	11.33	44.97	38.87	8.01	3.9		1535.33	1.64
225	212	1.74	2.81											1546.69	2.71
227	0	1.69	2.73	51.12	1.37	57.84	0.4	28.98	52.58	18.04	5.6	20.6			
227	2	1.74	2.75	45.94	1.23	55.18									
227	4	1.73	2.74	47.03	1.26	55.78									
227	6	1.74	2.75	46.12	1.24	55.34									
227	8	1.74	2.75	45.80	1.23	55.19									
227	10	1.73	2.75	47.09	1.26	55.78	0.4	25.55	53.25	20.8	6.07	14.9			
227	12	1.74	2.74	45.55	1.22	54.99									
227	14	1.69	2.75	51.48	1.39	58.08									
227	16	1.74	2.76	45.55	1.22	55.03									
227	18	1.77	2.75	42.89	1.15	53.52									
227	20	1.80	2.75	40.24	1.08	51.97	1.29	33.49	44.16	21.06	5.81	17.8			
227	22	1.77	2.75	43.04	1.16	53.63									
227	24	1.76	2.75	44.16	1.19	54.30									
227	26	1.74	2.76	45.41	1.22	54.94									
227	28	1.78	2.75	41.77	1.12	52.84									
227	30	1.78	2.75	41.91	1.12	52.87	1.57	41.42	39.69	17.31	5.09	29.4			
227	32	1.75	2.74	44.82	1.20	54.64									
227	34	1.82	2.75	38.24	1.02	50.60								1528.29	2.78
227	36	1.80	2.74	39.59	1.06	51.50								1577.67	2.84
227	38	1.78	2.75	41.26	1.11	52.50								1579.94	2.82
227	40	1.84	2.74	36.22	0.97	49.28	1.93	40.54	38.67	18.86	5.41	23.5		1572.25	2.89
227	42	1.77	2.75	43.05	1.16	53.63								1585.75	2.80
227	44	1.80	2.75	40.09	1.08	51.84								1571.32	2.83
227	46	1.83	2.75	37.71	1.01	50.36								1560.29	2.85
227	48	1.81	2.75	39.12	1.05	51.31								1576.39	2.86
227	50	1.80	2.76	39.90	1.07	51.79	0.68	37.15	42.05	20.11	5.87	17.1		1573.14	2.84

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	%Carb	Vp (m/s)	IMP (kg/ cm^2s)
227	52	1.81	2.76	38.87	1.05	51.11									
227	54	1.82	2.75	38.65	1.04	51.00								1563.69	2.83
227	56	1.81	2.76	39.06	1.05	51.29								1571.73	2.86
227	58	1.78	2.76	41.73	1.13	52.94								1575.18	2.86
227	60	1.79	2.76	40.99	1.11	52.50	7.03	39.29	36.66	17.02	4.87	34.2		1568.71	2.80
227	62	1.83	2.76	37.82	1.02	50.58								1567.10	2.81
227	64	1.81	2.77	39.37	1.06	51.46								1557.52	2.85
227	66	1.83	2.76	37.51	1.01	50.26								1570.12	2.84
227	68	1.81	2.76	38.95	1.05	51.23								1571.73	2.88
227	70	1.83	2.76	38.09	1.03	50.74	3.77	45.78	33.63	16.81	4.67	39.3		1566.49	2.84
227	72	1.84	2.77	36.76	0.99	49.80								1569.70	2.87
227	74	1.82	2.76	38.38	1.04	50.94								1566.69	2.88
227	76	1.81	2.77	39.12	1.06	51.37								1569.91	2.86
227	78	1.80	2.77	40.30	1.09	52.07								1573.14	2.85
227	80	1.85	2.76	36.44	0.99	49.63								1570.32	2.83
227	82	1.84	2.77	36.95	1.00	49.97	6.54	44.69	30.96	17.8	4.75	37.2		1568.92	2.90
227	84	1.84	2.77	37.31	1.01	50.28								1574.38	2.90
227	86	1.83	2.78	37.50	1.01	50.29								1575.21	2.90
227	88	1.91	2.76											1588.70	2.91
227	90	1.99	2.77												
227	92	1.68	2.77				3.82	42.57	33.43	20.18	5.25	26.3		1564.93	3.11
227	94	1.74	2.77												
227	96	1.86	2.77	34.97	0.95	48.61									
227	98	1.88	2.77	33.97	0.92	47.89	8.63	43.69	28.85	18.82	4.24	52.9			
227	100	1.92	2.82	32.09	0.88	46.93									
227	102	1.94	2.81	30.28	0.83	45.36								1549.96	3.01
227	104	1.91	2.80	32.35	0.88	46.90								1551.77	2.96
227	106	1.95	2.79	29.40	0.80	44.44								1550.16	3.02
227	108	1.93	2.78	30.10	0.82	44.97	11.42	41.03	27.56	20	4.38	48.0			
227	110	1.95	2.81	29.81	0.82	44.98								1551.98	3.02
227	112	1.94	2.77	29.49	0.80	44.35								1542.60	2.99
227	114	1.92	2.83	32.40	0.90	47.25								1557.23	2.99
227	116	1.96	2.86	30.35	0.85	45.87								1569.27	3.08
227	118	1.97	2.77	27.13	0.73	42.33	15.94	34.1	25.32	24.64	4.62	40.7		1553.02	3.07
227	120	2.03	2.77	23.81	0.64	39.14								1561.10	3.16
227	122	1.93	2.77	29.72	0.80	44.52								1581.06	3.06
227	124	1.95	2.80	29.71	0.81	44.82								1543.84	3.01
227	126	1.96	2.82	29.62	0.82	44.91								1531.44	2.99
227	128	1.89	2.77	33.00	0.89	47.17	11.62	29.92	30.22	28.25	5.76	18.5		1536.14	2.90
227	130	1.92	2.75	30.08	0.81	44.68								1557.07	2.99
227	132	1.94	2.84	30.85	0.85	46.07								1541.08	3.00
227	134	1.94	2.83	31.14	0.86	46.24								1539.70	2.98
227	136	1.95	2.77	28.94	0.78	43.95								1555.87	3.03
227	138	1.94	2.80	30.08	0.82	45.13	7.65	47	30.11	15.25	4.43	46.4		1559.52	3.03
227	140	1.94	2.82	30.89	0.85	45.98								1548.89	3.00
167	0	1.56	2.70	67.13	1.81	64.44	0.46	29.92	48.87	20.74	5.70	19.2		1532.72	2.40
167	2	1.70	2.72	53.31	1.45	59.17								1536.93	2.61
167	4	1.73	2.71	56.59	1.53	60.52								1544.68	2.67
167	6	1.73	2.71	52.62	1.43	58.81								1543.33	2.66
167	8	1.76	2.71	49.11	1.33	57.11								1544.88	2.72
167	10	1.75	2.72	46.92	1.28	56.06	3.17	40.17	39.41	17.25	4.81	35.6		1551.14	2.72
167	12	1.86	2.71	46.30	1.26	55.69								1540.22	2.87
167	14	1.83	2.72	43.08	1.17	53.93								1546.44	2.82
167	16	1.80	2.72	49.83	1.35	57.50								1551.14	2.79
167	18	1.82	2.72	41.71	1.13	53.16								1551.34	2.82
167	20	1.85	2.72	42.26	1.15	53.49	2.28	41.03	39.50	17.19	4.89	33.7		1551.34	2.86
167	22	1.85	2.72	41.03	1.12	52.77								1551.34	2.88
167	24	1.84	2.72	40.44	1.10	52.42								1560.21	2.87
167	26	1.85	2.72	39.71	1.08	51.93								1555.46	2.88
167	28	1.92	2.72	38.12	1.04	50.93								1566.39	3.01
167	30	1.88	2.72	40.61	1.10	52.46	4.52	47.61	32.80	15.07	4.44	46.1		1568.00	2.95
167	32	1.89	2.72	38.15	1.04	50.91								1562.99	2.96
167	34	1.91	2.72	39.20	1.07	51.58								1565.98	2.98
167	36	1.87	2.73	38.59	1.05	51.26								1567.38	2.94

CORE	Sample Interval (cm)	Wet Bulk Density (g/cc)	Grain Density (g/cc)	Water Content (%)	Void Ratio	Porosity (%)	% Grav.	% Sand	% Silt	% Clay	MGS (phi)	MGS (microns)	% Carb	Vp (m/s)	IMP (kg/cm^2s)
167	38	1.86	2.73	38.71	1.06	51.34									
167	40	1.85	2.74	41.08	1.12	52.93	3.89	48.04	32.17	15.90	4.40	47.4		1570.60	2.93
167	42	1.88	2.74	39.87	1.09	52.20								1568.78	2.90
167	44	1.89	2.73	39.13	1.07	51.65								1568.57	2.96
167	46	1.88	2.73	39.88	1.09	52.11								1568.37	2.96
167	48	1.88	2.73	39.50	1.08	51.90								1563.36	2.93
167	50	1.88	2.73	39.03	1.06	51.57	7.85	44.56	30.79	16.80	4.43	46.4		1566.15	2.95
167	52	1.87	2.73	39.59	1.08	51.94								1554.59	2.93
167	54	1.89	2.73	37.76	1.03	50.76								1557.56	2.92
167	56	1.89	2.73	35.44	0.97	49.17								1563.73	2.96
167	58	1.91	2.72	36.62	1.00	49.94								1563.73	2.95
167	60	1.88	2.72	37.60	1.02	50.58	4.70	48.93	29.36	17.01	4.45	45.8		1561.92	2.99
167	62	1.95	2.72	37.19	1.01	50.28								1555.36	2.92
167	64	1.90	2.74	38.04	1.04	51.04								1558.12	3.04
167	66	1.91	2.72	36.51	0.99	49.87								1556.33	2.96
167	68	1.91	2.73	34.65	0.95	48.63								1556.33	2.98
167	70	1.91	2.73	37.06	1.01	50.31	13.61	43.25	26.84	16.29	3.87	68.4		1557.92	2.97
167	72	1.91	2.73	35.98	0.98	49.55								1556.13	2.97
167	74	1.90	2.73	38.04	1.04	50.98								1562.49	2.99
167	76	1.93	2.74	36.87	1.01	50.23								1559.30	2.96
167	78	1.95	2.72	34.89	0.95	48.73								1565.49	3.02
167	80	1.95	2.74	31.65	0.87	46.40	15.93	43.15	23.80	17.12	3.48	89.6		1557.51	3.04
167	82	1.97	2.74	32.88	0.90	47.39								1559.10	3.04
167	84	1.95	2.73	30.10	[illegible]	45.07								1562.08	3.07
167	86	1.99	2.73	28.73	0.78	43.95								1554.14	3.03
167	88	1.95	2.74	32.47	0.89	47.08								1558.69	3.10
167	90	1.94	2.74	31.21	0.86	46.12	13.68	43.22	24.12	18.98	3.81	71.3		1564.88	3.05
167	92	1.94	2.74	31.90	0.87	46.66								1569.50	3.04
167	94	1.96	2.73	35.86	0.98	49.46								1553.32	3.02
167	96	1.96	2.74	33.67	0.92	47.94								1674.10	3.28
167	98	1.95	2.74	33.03	0.90	47.49								1567.27	3.07
167	100	2.02	2.76	30.59	0.84	45.79	38.01	27.89	17.47	16.63	1.96	257.0		1564.05	3.05
167	102	1.98	2.74	31.89	0.87	46.64								1578.62	3.19
167	104	2.02	2.75	29.01	0.80	44.36								1573.73	3.12
167	106	2.06	2.74	24.96	0.68	40.65								1567.27	3.16
167	108													1568.88	3.23
167	110													1719.16	
														1570.49	

APPENDIX C.

All raw data from the Boca Raton study area.

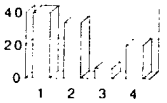
	QTZ	ARAGONITE	CALCITE	HMC
HILLS INLET				
0-2 cm	44.3	39.1	12.2	4.3
2-4 cm	48.5	36.3	11.4	3.9
4-6 cm	33.7	48.5	13.6	4.2
6-8 cm	45.7	38.6	11.7	4.0
8-10 cm	33.5	48.3	14.5	3.6
10-12 cm	37.2	46.7	11.5	4.6
NSO1-2				
0-2 cm	20.6	42.1	5.2	32.1
2-4 cm	17.7	41.6	4.8	35.9
4-6 cm	15.7	43.1	4.2	37.1
6-8 cm	7.4	44.3	3.7	44.5
8-10 cm	6.2	44.0	3.7	46.1
10-12 cm	6.7	43.2	5.2	44.9
12-14 cm	8.3	46.8	5.5	39.4
NSO1-4				
0-2 cm	45.3	31.0	5.9	17.7
2-4 cm	42.0	31.8	6.8	19.3
4-6 cm	37.0	35.4	6.6	21.0
6-8 cm	34.9	35.5	5.5	24.1
8-10 cm	33.5	39.7	5.9	21.0
10-12 cm	39.0	32.4	5.5	23.1
12-14 cm	43.1	33.1	6.4	17.3
14-15 cm	43.5	30.3	6.2	20.1
NSO2-4				
0-2 cm	42.4	38.6	10.4	8.6
2-4 cm	38.0	40.2	12.2	9.6
4-6 cm	42.5	37.9	12.1	7.5
6-8 cm	43.2	32.6	16.4	7.7
8-10 cm	41.7	38.8	11.7	7.8
10-12 cm	45.8	34.2	12.0	8.0
12-14 cm	43.3	35.2	12.4	9.1
NSO3-4				
0-2 cm	48.7	30.2	9.3	11.9
2-4 cm	51.9	30.3	8.7	9.0
4-6 cm	51.7	27.2	10.4	10.7
6-8 cm	51.1	27.1	10.7	11.1
8-10 cm	52.3	25.4	10.7	11.7
10-12 cm	52.0	28.7	9.7	9.6
12-14 cm	51.5	27.0	9.9	11.6
14-16 cm	51.2	27.8	8.9	12.1
16-18 cm	50.7	29.0	9.6	10.7
18-20 cm	50.0	29.1	8.6	12.3
20-22 cm	49.7	34.1	6.9	9.3
NSO4-4				
0-2 cm	47.9	33.9	11.4	6.9
2-4 cm	52.6	30.7	10.7	6.1
4-6 cm	47.3	35.7	10.5	6.5
6-8 cm	45.0	36.8	11.5	6.7
8-10 cm	44.6	31.7	13.6	10.1
10-12 cm	47.2	32.4	11.4	9.0
NSO5-1				
0-2 cm	47.2	33.4	12.2	7.2
2-4 cm	49.1	33.9	9.8	7.1
4-6 cm	47.0	36.4	9.6	7.0
6-8 cm	42.8	37.7	11.3	8.2
8-10 cm	41.1	37.3	12.1	9.6
10-12 cm	43.3	36.3	12.7	7.8
12-14 cm	39.0	38.6	13.3	9.1
14-16 cm	37.1	43.5	9.6	9.7
16-18 cm	37.1	39.6	12.8	10.5

ave. QTZ | ave. ARAGONIT | ave. CALCITE | ave. HMC

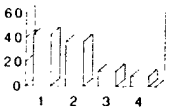
HILLS INLET HIST.
Q/A/C/H

NSO1-2 Q/A/C/H

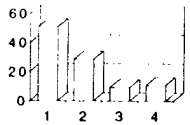
NS01-4 Q/A/C/H



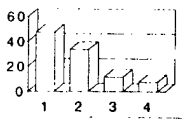
NS02-4 Q/A/C/H



NS03-4 Q/A/C/H



NS04-4 Q/A/C/H



NS05-1 Q/A/C/H

			INITIAL	FINAL	DENSITY	DENSITY	WATER	VOID	POROSITY
			WEIGHT	WT.	wet g/cc	dry g/cc	CONT. %	RATIO e	n
			13.73	10.4	1.94	2.69	32.0192308	0.86131731	46.2746091
			14.37	11.02	1.94	2.67	30.399274	0.81166062	44.8020236
			13.17	10.14	1.96	2.72	29.8816568	0.81278107	44.8361405
			10.92	8.42	1.99	2.69	29.6912114	0.79869359	44.4040938
			13.14	10.1	1.97	2.69	30.0990099	0.80966337	44.7411039
			13.44	10.35	1.94	2.67	29.8550725	0.79713043	44.3557362
	62557515	39.9871025	10.8549	8.819	2.074	2.747	23.0853838	0.63415549	38.8063129
			11.842	9.5311	2.08	2.77	24.2458898	0.67221729	40.1991593
			8.54	6.75	2.13	2.8	26.5185185	0.74251852	42.6118007
			9.02	7.09	2.09	2.76	27.2214386	0.75131171	42.899942
			10.3878	8.18	2.009	2.742	26.99022	0.74007183	42.5311082
			7.309	5.899	2.086	2.782	23.9023563	0.66496355	39.9386252
			10.1034	8.0159	2.033	2.718	26.0419915	0.70782133	41.4458654
			10.185	8.008	2.04	2.74	27.1853147	0.744787	42.686414
			8.6601	6.9209	2.033	2.675	25.1296797	0.67221893	40.1992179
	6.10443861	20.4661546	10.736	8.364	2.00	2.74	28.3596365	0.77563606	43.682153
			9.151	7.2085	2.00	2.73	26.9473538	0.73431539	42.3403606
			9.44	7.38	2.03	2.73	27.9132791	0.76203252	43.2473585
			8.999	6.68	1.99	2.71	34.7155689	0.93975045	48.4469768
			8.486	6.577	2.01	2.72	29.0253915	0.79007116	44.1362989
			9.199	7.233	1.99	2.66	27.1809761	0.72355758	41.9804705
			10.033	7.674	1.95	2.69	30.7401616	0.82609061	45.2382048
			10.117	7.872	2.01	2.73	28.5258772	0.77913679	43.7929672
	12.474952	8.32587323	12.8595	10.4664	2.091	2.757	22.8645953	0.63037689	38.6644889
			12.123	9.9724	2.087	2.717	21.5655208	0.5859352	36.9457214
			12.3396	10.1158	2.093	2.69	21.9834319	0.59135432	37.1604432
			10.297	8.4452	2.108	2.641	21.9272486	0.57909864	36.6727336
			9.8006	8.1572	2.151	2.795	20.1466189	0.563098	36.0244847
			10.9914	9.003	2.09	2.762	22.0859713	0.61001453	37.8887592
			11.2247	9.099	2.06	2.726	23.3619079	0.63684561	38.9068832
			11.513	9.174	2.043	2.68	25.4959669	0.68439674	40.6315639
	9.39110567	10.9052812	12.6193	10.0393	2.02	2.726	25.6990029	0.70055482	41.1956622
			11.66	9.16	2.01	2.72	27.2925764	0.74235808	42.6065163
			12.12	9.54	2.03	2.74	27.0440252	0.74100629	42.5619536
			9.356	7.546	2.056	2.751	23.9862179	0.65986085	39.7539861
			11.0971	8.8973	2.072	2.694	24.7243546	0.66607411	39.9786605
			11.1045	8.7956	2.006	2.716	26.2506253	0.71296698	41.6217586
			10.689	8.517	2.05	2.71	25.5019373	0.6911025	40.8669788
	11.506138	7.53737859	13.3028	10.9626	2.124	2.77	21.3471257	0.59131538	37.1589057
			9.92	8.07	2.14	2.73	22.9244114	0.62583643	38.4931977
			10.84	8.75	2.12	2.75	23.8857143	0.65685714	39.6447663
			13.53	10.98	2.1	2.73	23.2240437	0.63401639	38.8011036
			13.08	10.54	2.06	2.73	24.0986717	0.65789374	39.6825033
			13.6	10.99	2.08	2.73	23.7488626	0.64834395	39.33305
			12.29	10	2.12	2.72	22.9	0.62288	38.3811496
	11.4831129	8.47988476	10.498	8.684	2.1872	2.748	20.8889912	0.57402948	36.4687884
			12.994	10.793	2.163	2.745	20.3928472	0.55978366	35.8885448
			12.545	10.211	2.116	2.728	22.8577025	0.62355812	38.4068864
			10.539	8.757	2.199	2.768	20.3494347	0.56327235	36.03162
			11.553	9.673	2.195	2.753	19.4355422	0.53506048	34.8559868
			12.5	10.378	2.162	2.74	20.4470996	0.56025053	35.9077289
			11.558	9.611	2.177	2.78	20.2580377	0.5631734	36.0275725
			13.105	10.832	2.123	2.742	20.9841211	0.5753846	36.5234369
			11.62	9.649	2.179	2.754	20.4269873	0.56255923	36.0024259
			9.92	8.32	2.22	2.77	19.2307692	0.53269231	34.7553325

NSO6-3														
0-2 cm	36.4	34.0	8.2	21.4	NS06-3 Q/A/C/H	7.9863803	22.0363627	9.54	7.33	2	2.76	30.1500682	0.83214188	45.4190743
2-4 cm	36.7	36.7	7.3	19.3				9.23	6.96	1.98	2.78	32.6149425	0.9066954	47.553238
4-6 cm	40.3	31.4	8.2	20.2				11.39	8.87	2	2.73	28.410372	0.77560316	43.6811094
6-8 cm	38.5	31.9	8.1	21.5				11.2784	9.0088	2.06	2.757	25.1931445	0.69457499	40.9881531
8-10 cm	38.6	33.1	7.4	20.8				13	10.18	2.02	2.74	27.7013752	0.75901768	43.1500882
10-12 cm	40.5	32.9	7.5	19.1				11.32	8.85	2.03	2.74	27.9096045	0.76472316	43.3338883
12-14 cm	29.7	33.5	10.6	26.2				9.75	7.69	2.08	2.77	26.7880364	0.74202861	42.5956615
14-16 cm	30.3	38.7	6.8	24.1				11.4011	9.0912	2.045	2.719	25.4080869	0.69084588	40.8580043
16-18 cm	29.0	37.6	7.7	25.7				10.87	8.39	2.03	2.77	29.5589988	0.81878427	45.018218
NSO7-3														
0-2 cm	53.0	29.4	9.8	7.8	NS07-3 Q/A/C/H	1.0666623	8.07722713	8.45	6.83	2.14	2.77	23.7188873	0.65701318	39.6504497
2-4 cm	54.8	27.2	11.1	6.9				12	9.58	2.06	2.74	25.2609603	0.69215031	40.9035951
4-6 cm	53.4	20.2	20.3	6.1				9.52	7.61	2.09	2.75	25.0985545	0.69021025	40.8357629
6-8 cm	53.4	27.8	9.7	9.1				7.85	6.26	2.12	2.78	25.399361	0.70610224	41.3868654
8-10 cm	53.3	33.8	6.8	6.1				10.66	8.58	2.1	2.73	24.2424242	0.66181818	39.8249453
10-12 cm	52.3	27.4	10.3	10.0				8.79	7.03	2.08	2.73	25.0355619	0.68347084	40.5989117
12-14 cm	53.7	26.6	12.4	7.4				8.76	6.99	2.07	2.78	25.3218884	0.7039485	41.3127802
14-16 cm	51.7	30.5	9.6	8.2				8.1	6.38	2.09	2.8	26.9592476	0.75485893	43.0153626
16-18 cm	51.5	29.2	10.3	9.1				7.44	6.05	2.16	2.81	22.9752066	0.64560331	39.2320132
18-19 cm	47.8	31.8	10.3	10.1				8.36	6.81	2.16	2.79	22.7606461	0.63502203	38.8387444
								10.38	8.23	2.06	2.73	26.1239368	0.71318348	41.6291358

APPENDIX C.

Raw data from the Boca Raton study area.

BR NED

POROSITY,VOID RATIO,DENSITY

SAMPLE	INITIAL WEIGHT	FINAL WT.	DENSITY wet g/cc	DENSITY dry g/cc	WATER CONT. %	VOID RATIO e	POROSITY n
NS-01-1 (0-2)cm	10.8549	8.819	2.074	2.747	23.0854	0.634155	38.806313
NS-01-1 (2-4)cm	11.842	9.531	2.08	2.77	24.2459	0.672217	40.199159
NS-01-1 (4-6)cm	8.54	6.75	2.13	2.8	26.5185	0.742519	42.611801
NS-01-1 (6-8)cm	9.02	7.09	2.09	2.76	27.2214	0.751312	42.899942
NS-01-1 (8-10)cm	10.3878	8.18	2.009	2.742	26.9902	0.740072	42.531108
NS-01-1 (10-12)cm	7.309	5.899	2.086	2.782	23.9024	0.664964	39.938625
NS-01-1 (12-14)cm	10.1034	8.016	2.033	2.718	26.042	0.707821	41.445865
NS-01-1 (14-16)cm	10.185	8.008	2.04	2.74	27.1853	0.744787	42.686414
NS-01-1 (16-18)cm	8.6601	6.921	2.033	2.675	25.1297	0.672219	40.199218
NS-01-3 (0-2)cm	10.736	8.364	2.00	2.74	28.3596	0.775636	43.682153
NS-01-3 (4-6)cm	9.44	7.38	2.03	2.73	27.9133	0.762033	43.247358
NS-01-3 (6-8)cm	8.999	6.68	1.99	2.71	34.7156	0.93975	48.446977
NS-01-3 (8-10)cm	8.486	6.577	2.01	2.72	29.0254	0.790071	44.136299
NS-01-3	9.199	7.233	1.99	2.66	27.181	0.723558	41.980471

(10-12)cm							
NS-01-3 (12-14)cm	10.033	7.674	1.95	2.69	30.7402	0.826091	45.238205
NS-01-3 (14-16)cm	10.117	7.872	2.01	2.73	28.5259	0.779137	43.792967
NS-2-1 (4-6)cm	13.3161	10.91	2.096	2.771	22.0753	0.611708	37.954007
NS-02-1 (6-8)cm	11.1983	9.278	2.14	2.764	20.7039	0.572255	36.397066
NS-02-1 (8-10)cm	10.09	8.3	2.17	2.77	21.5663	0.597386	37.397706
NS-02-1 (12-14)cm	12.75	10.29	2.08	2.73	23.9067	0.652653	39.491232
NS-02-1 (14-16)cm	14.2742	11.66	2.081	2.726	22.4013	0.610661	37.913675
NS-02-1 (16-18)cm	14.15	11.25	2.03	2.71	25.7778	0.698578	41.127218
NS-02-2 (0-2)cm	12.8595	10.47	2.091	2.757	22.8646	0.630377	38.664489
NS-02-2 (2-4)cm	12.123	9.972	2.087	2.717	21.5655	0.585935	36.945721
NS-02-2 (4-6)cm	12.3396	10.12	2.093	2.69	21.9834	0.591354	37.160443
NS-02-2 (6-8)cm	10.297	8.445	2.108	2.641	21.9272	0.579099	36.672734
NS-02-2 (10-12)cm	10.9914	9.003	2.09	2.762	22.086	0.610015	37.888759
NS-02-2 (12-14)cm	11.2247	9.099	2.06	2.726	23.3619	0.636846	38.906883
NS-02-2 (14-16)cm	11.513	9.174	2.043	2.68	25.496	0.684397	40.631564

NS-03-1 (2-4)cm	11.6292	9.231	2.024	2.702	25.9826	0.702049	41.247296
NS-03-1 (4-6)cm	13.8908	11.1	2.027	2.613	25.1345	0.656763	39.641344
NS-03-1 (6-8)cm	11.453	9.263	2.071	2.695	23.6371	0.63702	38.913395
NS-03-2 (2-4)cm	11.66	9.16	2.01	2.72	27.2926	0.742358	42.606516
NS-03-2 (4-6)cm	12.12	9.54	2.03	2.74	27.044	0.741006	42.561954
NS-04-1 (0-2)cm	13.3028	10.96	2.124	2.77	21.3471	0.591315	37.158906
NS-04-1 (2-4)cm	9.92	8.07	2.14	2.73	22.9244	0.625836	38.493198
NS-04-1 (4-6)cm	10.84	8.75	2.12	2.75	23.8857	0.656857	39.644766
NS-04-1 (6-8)cm	13.53	10.98	2.1	2.73	23.224	0.634016	38.801104
NS-04-1 (8-10)cm	13.08	10.54	2.06	2.73	24.0987	0.657894	39.682503
NS-04-1 (10-12)cm	13.6	10.99	2.08	2.73	23.7489	0.648344	39.33305
NS-04-1 (12-14)cm	12.29	10	2.12	2.72	22.9	0.62288	38.38115
NS-04-2 (2-4)cm	9.8972	8.111	2.096	2.759	22.025	0.607668	37.798122
NS-04-2 (4-6)cm	9.347	7.7	2.141	2.831	21.3896	0.60554	37.715654
NS-04-2 (6-8)cm	10.1316	8.374	2.138	2.813	20.9844	0.590292	37.118479

NS-04-2 (8-10)cm	10.1822	8.327	2.079	2.735	22.2735	0.609179	37.856513
NS-04-2 (12-14)cm	12.9672	10.57	2.075	2.755	22.6607	0.624303	38.435119
NS-05-2 (2-4)cm	10.3175	8.545	2.149	2.806	20.7445	0.582092	36.79254
NS-05-2 (4-6)cm	13.5732	11.07	2.092	2.736	22.5981	0.618283	38.206117
NS-05-2 (6-8)cm	11.1932	9.166	2.103	2.752	22.1218	0.608793	37.841608
NS-05-2 (8-10)cm	9.6686	7.947	2.119	2.776	21.662	0.601337	37.552177
NS-05-2 (12-14)cm	14.1214	11.66	2.116	2.746	21.142	0.580559	36.731241
NS-05-2 (14-18)cm	13.6734	11.15	2.095	2.744	22.5841	0.619708	38.260482
NS-5-3 (0-2)cm	10.498	8.684	2.1872	2.748	20.889	0.574029	36.468788
NS-5-3 (2-4)cm	12.994	10.79	2.163	2.745	20.3928	0.559784	35.888545
NS-5-3 (4-6)cm	12.545	10.21	2.116	2.728	22.8577	0.623558	38.406886
NS-5-3 (6-8)cm	10.539	8.757	2.199	2.768	20.3494	0.563272	36.03162
NS-5-3 (8-10)cm	11.553	9.673	2.195	2.753	19.4355	0.53506	34.855987
NS-5-3 (10-12)cm	12.5	10.38	2.162	2.74	20.4471	0.560251	35.907729
NS-5-3 (12-14)cm	11.558	9.611	2.177	2.78	20.258	0.563173	36.027573
NS-5-3	13.105	10.83	2.123	2.742	20.9841	0.575385	36.523437

(14-16)cm							
NS-5-3 (16-18)cm	11.62	9.649	2.179	2.754	20.427	0.562559	36.002426
NS-5-3 (18-20)cm	9.92	8.32	2.22	2.77	19.2308	0.532692	34.755332
NS-06-1 (2-4)cm	10.51	8.27	2.05	2.79	27.0859	0.755695	43.042508
NS-06-1 (4-6)cm	8.37	6.35	2.02	2.78	31.811	0.884346	46.931203
NS-06-1 (6-8)cm	7.67	5.71	2	2.83	34.3257	0.971419	49.275105
NS-06-1 (8-10)cm	8.19	6.12	1.96	2.8	33.8235	0.947059	48.640483
NS-06-1 (12-14)cm	9.55	6.77	1.89	2.8	41.0635	1.149778	53.483578
NS-06-1 (14-16)cm	10.46	7.5	1.88	2.79	39.4667	1.10112	52.406336
NS-06-2 (0-2)cm	9.54	7.33	2	2.76	30.1501	0.832142	45.419074
NS-06-2 (2-4)cm	9.23	6.96	1.98	2.78	32.6149	0.906695	47.553238
NS-06-2 (4-6)cm	11.39	8.87	2	2.73	28.4104	0.775603	43.681109
NS-06-2 (8-10)cm	13	10.18	2.02	2.74	27.7014	0.759018	43.150088
NS-06-2 (10-12)cm	11.32	8.85	2.03	2.74	27.9096	0.764723	43.333888
NS-06-2 (12-14)cm	9.75	7.69	2.08	2.77	26.788	0.742029	42.595661
NS-06-2 (16-18)cm	10.87	8.39	2.03	2.77	29.559	0.818784	45.018218

NS-07-1 (2-4)cm	8.8393	7.134	2.07	2.729	23.9091	0.652478	39.484823
NS-07-1 (4-6)cm	13.9454	11.29	2.071	2.724	23.4959	0.640027	39.025407
NS-07-1 (6-8)cm	11.7106	9.374	2.062	2.717	24.9277	0.677286	40.379886
NS-07-1 (8-10)cm	10.4712	8.405	2.071	2.767	24.5815	0.68017	40.482221
NS-07-1 (12-14)cm	12.1879	9.667	2.019	2.716	26.0813	0.708368	41.464596
NS-07-1 (14-16)cm	11.9891	9.659	2.08	2.761	24.13	0.66623	39.984291
NS-07-1 (16-18)cm	9.37	7.3	2.13	2.77	28.3562	0.785466	43.992205
NS-07-1 (18-20)cm	9.9052	7.996	2.066	2.833	23.8831	0.676609	40.35581
NS-07-2 (0-2)cm	8.45	6.83	2.14	2.77	23.7189	0.657013	39.65045
NS-07-2 (2-4)cm	12	9.58	2.06	2.74	25.261	0.69215	40.903595
NS-07-2 (4-6)cm	9.52	7.61	2.09	2.75	25.0986	0.69021	40.835763
NS-07-2 (6-8)cm	7.85	6.26	2.12	2.78	25.3994	0.706102	41.386865
NS-07-2 (8-10)cm	10.66	8.58	2.1	2.73	24.2424	0.661818	39.824945
NS-07-2 (10-12)cm	8.79	7.03	2.08	2.73	25.0356	0.683471	40.598912
NS-07-2 (12-14)cm	8.76	6.99	2.07	2.78	25.3219	0.703948	41.31278

NS-07-2 (14-16)cm	8.1	6.38	2.09	2.8	26.9592	0.754859	43.015363
NS-07-2 (16-18)cm	7.44	6.05	2.16	2.81	22.9752	0.645603	39.232013
NS-07-2 (18-20)cm	8.36	6.81	2.16	2.79	22.7606	0.635022	38.838744
NS-07-2 (20-22)cm	10.38	8.23	2.06	2.73	26.1239	0.713183	41.629136
angie 1 (14-16)cm	13.35	11.16	2.21	2.78	19.6237	0.545538	35.297596
angie 1 (16-18)cm	13.91	11.77	2.25	2.79	18.1818	0.507273	33.655006
angige 1 (18-20)cm	13.86	11.41	2.16	2.74	21.4724	0.588344	37.041329
angie 1 (20-22)cm	13.14	10.71	2.13	2.76	22.6891	0.626218	38.507648
angie 7 (0-2)cm	13.73	10.4	1.94	2.69	32.0192	0.861317	46.274609
angie 7 (2-4)cm	14.37	11.02	1.94	2.67	30.3993	0.811661	44.802024
angie 7 (4-6)cm	13.17	10.14	1.96	2.72	29.8817	0.812781	44.83614
angie 7 (6-8)cm	10.92	8.42	1.99	2.69	29.6912	0.798694	44.404094
angie 7 (8-10)cm	13.14	10.1	1.97	2.69	30.099	0.809663	44.741104
angie 7 (10-12)cm	13.44	10.35	1.94	2.67	29.8551	0.79713	44.355736
angie 7 (12-14)cm	12.99	9.93	1.94	2.68	30.8157	0.825861	45.231319
angie 7	12.05	9.25	1.96	2.73	30.2703	0.826378	45.246833

(14-16)cm							
angie 7	12.59	9.87	1.99	2.7	27.5583	0.744073	42.662949
(16-18)cm							
angie 7	11.96	9.53	2.05	2.71	25.4984	0.691007	40.863651
(18-20)cm							
angie 7	13.05	10.28	2	2.69	26.9455	0.724835	42.023427
(20-22)cm							

Cruise: Suncoaster Station: NS01-1 date: 9 Nov 94
lat: 26-19.57 N long: 80-03.62 W depth: 22 m

calc for: 27.0 deg C 36.0 o/oo 22.0 m 400 kHz
ref core: 25.5 deg C 79.88 delta-t 393.8 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1536.0	0.998	21.9	0.055
0.0	1542.2	1.002	146.6	0.367
1.0	1544.9	1.004	448.5	1.121
2.0	1568.7	1.019	613.2	1.533
3.0	1549.6	1.007	589.9	1.475
4.0	1642.1	1.067	589.9	1.475
5.0	1637.2	1.063	558.2	1.396
6.0	1646.0	1.069	491.2	1.228
7.0	1659.9	1.078	484.2	1.211
8.0	1658.5	1.077	506.3	1.266
9.0	1655.9	1.076	552.5	1.381
10.0	1652.3	1.073	597.2	1.493
11.0	1672.2	1.086	482.6	1.207
12.0	1681.8	1.092	413.6	1.034
13.0	1683.7	1.094	415.7	1.039
14.0	1689.7	1.098	409.7	1.024
15.0	1683.7	1.094	343.4	0.858
16.0	1696.8	1.102	343.4	0.858
17.0	1706.2	1.108	325.6	0.814

Cruise: Suncoaster Station: NS01-2 date: 9 Nov 94
lat: 26 19.57 N long: 80 03.62 W depth: 22 m

calc for: 27.0 deg C 36.0 o/oo 22.0 m 400 kHz
ref core: 25.5 deg C 79.88 delta-t 393.8 H 1.000 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1536.8	0.998	981.4	2.453
0.0	1540.6	1.001	1043.1	2.608
1.0	1553.6	1.009	1381.4	3.453
2.0	1577.6	1.025	1506.6	3.767
3.0	1576.0	1.024	1477.2	3.693
4.0	1536.4	0.998	1584.2	3.961
11.0	1628.1	1.058	1611.2	4.028
13.0	1677.2	1.089	1523.2	3.808

Cruise: Suncoaster Station: NS01-3 date: 9 Nov 94
lat: 26 19.57 N long: 80 03.62 W depth: 22 m

calc for: 27.0 deg C 36.0 o/oo 22.0 m 400 kHz
ref core: 25.0 deg C 79.88 delta-t 387.5 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1538.3	0.999	-2.3	-0.006
0.0	1544.5	1.003	81.4	0.204
1.0	1675.2	1.088	225.2	0.563
2.0	1689.5	1.097	204.5	0.511
3.0	1703.2	1.106	255.6	0.639
4.0	1707.5	1.109	300.7	0.752
5.0	1714.2	1.113	319.0	0.797
6.0	1712.2	1.112	271.7	0.679
7.0	1711.3	1.112	241.1	0.603
8.0	1711.8	1.112	222.4	0.556
9.0	1710.3	1.111	209.4	0.523
10.0	1710.3	1.111	209.4	0.523
11.0	1703.7	1.107	204.5	0.511
12.0	1703.2	1.106	199.7	0.499
13.0	1703.7	1.107	204.5	0.511
14.0	1704.1	1.107	199.7	0.499
15.0	1702.2	1.106	197.4	0.493
16.0	1697.5	1.103	202.1	0.505
17.0	1691.4	1.099	252.8	0.632

Cruise: Suncoaster Station: NS01-4 date: 9 Nov 94
lat: 26 19.57 N long: 80 03.62 W depth: 22 m

calc for: 27.0 deg C 36.0 o/oo 22.0 m 400 kHz
ref core: 25.0 deg C 79.89 delta-t 393.8 H 0.001 V/D
smp core: 36.0 o/oo 6.0 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1538.5	0.999	0.0	0.000
0.0	1543.2	1.002	73.1	0.183
1.0	1671.1	1.085	317.6	0.794
2.0	1693.2	1.100	237.3	0.593
3.0	1698.0	1.103	209.8	0.525
4.0	1701.4	1.105	220.0	0.550
5.0	1699.9	1.104	245.8	0.614
6.0	1701.3	1.105	239.7	0.599
7.0	1696.5	1.102	228.1	0.570
8.0	1694.6	1.101	228.1	0.570
9.0	1686.1	1.095	242.7	0.607
10.0	1692.2	1.099	263.1	0.658
11.0	1705.7	1.108	240.9	0.602
12.0	1707.1	1.109	214.8	0.537
13.0	1711.5	1.112	217.4	0.543
14.0	1450.9	0.942	1862.0	4.655
15.0	1703.2	1.106	411.7	1.029
16.0	1694.6	1.101	672.6	1.682
17.0	1694.6	1.101	588.5	1.471
18.0	1691.8	1.099	598.8	1.497

Cruise: Suncoaster Station: NS02-1 date: 10 Nov 94
lat: 26-19.63 N long: 80-03.82 W depth: 17.5 m

calc for: 27.0 deg C 36.0 o/oo 17.5 m 400 kHz
ref core: 24.5 deg C 79.93 delta-t 381.2 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1536.7	0.998	-4.6	-0.011
0.0	1646.2	1.069	125.6	0.314
1.0	1752.2	1.138	145.2	0.363
2.0	1756.2	1.141	145.2	0.363
3.0	1763.3	1.145	186.2	0.465
4.0	1771.5	1.151	125.6	0.314
5.0	1764.8	1.146	120.1	0.300
6.0	1768.4	1.149	134.3	0.336
7.0	1774.5	1.153	126.6	0.316
8.0	1775.6	1.153	129.9	0.325
9.0	1777.1	1.154	135.8	0.340
10.0	1777.6	1.155	138.9	0.347
11.0	1771.5	1.151	137.3	0.343
12.0	1772.0	1.151	146.8	0.367
13.0	1772.5	1.151	143.6	0.359
14.0	1770.4	1.150	145.2	0.363
15.0	1765.8	1.147	143.6	0.359
16.0	1749.7	1.137	129.9	0.325
17.0	1741.2	1.131	127.0	0.318
18.0	1738.3	1.129	121.4	0.304
19.0	1739.2	1.130	160.6	0.401
20.0	1735.8	1.128	184.0	0.460
21.0	1747.2	1.135	204.6	0.511

Cruise: Suncoaster Station: NS02-2 date: 10 Nov 94
lat: 26 19.63 N long: 80 03.82 W depth: 17.5 m

calc for: 27.0 deg C 36.0 o/oo 17.5 m 400 kHz
ref core: 24.5 deg C 79.91 delta-t 387.5 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1535.9	0.998	1.2	0.003
0.0	1756.7	1.141	289.8	0.724
1.0	1735.3	1.127	141.2	0.353
2.0	1745.2	1.134	139.7	0.349
3.0	1758.2	1.142	147.5	0.369
4.0	1751.2	1.138	202.1	0.505
5.0	1762.3	1.145	199.7	0.499
6.0	1760.3	1.143	166.5	0.416
7.0	1761.8	1.144	176.1	0.440
8.0	1761.3	1.144	184.2	0.461
9.0	1765.8	1.147	182.2	0.455
10.0	1765.3	1.147	152.5	0.381
11.0	1763.3	1.145	138.1	0.345
12.0	1759.8	1.143	164.7	0.412
13.0	1757.7	1.142	168.4	0.421
14.0	1763.3	1.145	182.2	0.455
15.0	1752.7	1.139	209.4	0.523
16.0	1757.7	1.142	180.1	0.450
17.0	1762.3	1.145	174.1	0.435
18.0	1753.7	1.139	159.3	0.398
19.0	1756.2	1.141	157.6	0.394

Cruise: Suncoaster Station: NS02-3 date: 10 Nov 94
lat: 26 19.63 N long: 80 03.82 W depth: 17.5 m

calc for: 27.0 deg C 36.0 o/oo 17.5 m 400 kHz
ref core: 25.0 deg C 79.91 delta-t 368.8 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1535.3	0.997	-11.6	-0.029
0.0	1760.2	1.143	192.7	0.482
1.0	1745.2	1.134	125.1	0.313
2.0	1755.7	1.140	116.7	0.292
3.0	1754.2	1.139	93.9	0.235
4.0	1752.2	1.138	96.6	0.241
5.0	1755.7	1.140	122.3	0.306
6.0	1750.7	1.137	140.5	0.351
7.0	1748.2	1.136	167.1	0.418
8.0	1738.7	1.129	188.1	0.470
9.0	1730.8	1.124	229.8	0.574
10.0	1720.1	1.117	402.2	1.005
11.0	1730.4	1.124	493.0	1.233
12.0	1719.7	1.117	417.2	1.043
13.0	1698.2	1.103	444.6	1.111
14.0	1695.8	1.102	496.9	1.242

Cruise: Suncoaster Station: NS03-1 date: 10 Nov 94
lat: 26-19.72 N long: 80-03.03 W depth: 20 m

calc for: 27.6 deg C 36.0 o/oo 20.0 m 400 kHz
ref core: 24.5 deg C 79.91 delta-t 393.8 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1537.2	0.998	0.0	0.000
0.0	1643.2	1.066	186.5	0.466
1.0	1746.7	1.134	308.9	0.772
2.0	1739.8	1.129	148.2	0.371
3.0	1736.3	1.127	143.5	0.359
4.0	1732.4	1.124	141.9	0.355
5.0	1735.8	1.127	141.9	0.355
6.0	1737.3	1.128	140.4	0.351
7.0	1736.3	1.127	143.5	0.359
8.0	1743.8	1.132	141.9	0.355
9.0	1746.2	1.133	145.0	0.363
10.0	1746.2	1.133	153.1	0.383
11.0	1740.3	1.129	170.7	0.427
12.0	1732.9	1.125	184.4	0.461
13.0	1726.1	1.120	219.3	0.548
14.0	1717.8	1.115	233.2	0.583

Cruise: Suncoaster Station: NS03-2 date: 10 Nov 94
lat: 26 19.72 N long: 80 03.03 W depth: 20 m

calc for: 27.6 deg C 36.0 o/oo 20.0 m 400 kHz
ref core: 24.5 deg C 79.91 delta-t 400.0 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1538.0	0.998	2.2	0.006
0.0	1758.3	1.141	398.4	0.996
1.0	1723.6	1.119	172.9	0.432
2.0	1727.0	1.121	184.6	0.462
3.0	1727.5	1.121	197.4	0.493
4.0	1716.9	1.114	193.0	0.483
5.0	1729.5	1.122	199.6	0.499
6.0	1735.4	1.126	186.7	0.467
7.0	1737.3	1.128	171.1	0.428
8.0	1737.8	1.128	163.9	0.410
9.0	1734.9	1.126	162.1	0.405
10.0	1726.6	1.121	158.7	0.397
11.0	1724.6	1.119	171.1	0.428
12.0	1735.4	1.126	171.1	0.428
13.0	1743.3	1.131	150.4	0.376
14.0	1741.3	1.130	162.1	0.405

Cruise: Suncoaster Station: NS03-3 date: 10 Nov 94
lat: 26 19.72 N long: 80 03.03 W depth: 20 m

calc for: 27.6 deg C 36.0 o/oo 20.0 m 400 kHz
ref core: 24.5 deg C 79.93 delta-t 400.0 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1540.7	1.000	0.0	0.000
0.0	1549.7	1.006	110.3	0.276
1.0	1720.7	1.117	252.0	0.630
2.0	1726.1	1.120	162.1	0.405
3.0	1732.9	1.125	162.1	0.405
4.0	1733.4	1.125	172.9	0.432
5.0	1724.1	1.119	178.7	0.447
6.0	1726.6	1.121	195.2	0.488
7.0	1730.5	1.123	197.4	0.493
8.0	1727.0	1.121	195.2	0.488
9.0	1727.0	1.121	201.9	0.505
10.0	1727.0	1.121	213.9	0.535
11.0	1722.7	1.118	241.4	0.603
12.0	1714.5	1.113	268.6	0.672
13.0	1704.5	1.106	282.5	0.706
14.0	1700.7	1.104	253.4	0.633
15.0	1697.4	1.102	227.0	0.567
16.0	1698.8	1.103	229.7	0.574
17.0	1700.7	1.104	257.4	0.643
18.0	1701.1	1.104	271.6	0.679
19.0	1704.0	1.106	240.7	0.602
20.0	1700.2	1.103	273.1	0.683
21.0	1692.2	1.098	290.8	0.727

Cruise: Suncoaster Station: NS03-4 date: 10 Nov 94
lat: 26 19.72 N long: 80 03.03 W depth: 17 m

calc for: 27.6 deg C 36.0 o/oo 17.0 m 400 kHz
ref core: 24.0 deg C 79.95 delta-t 393.8 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1539.5	0.999	0.0	0.000
0.0	1550.4	1.006	153.1	0.383
1.0	1550.4	1.006	153.1	0.383
1.0	1708.5	1.109	214.2	0.535
2.0	1727.2	1.121	151.4	0.379
3.0	1726.7	1.121	156.4	0.391
4.0	1731.1	1.124	178.4	0.446
5.0	1735.1	1.126	206.7	0.517
6.0	1724.3	1.119	190.8	0.477
7.0	1732.6	1.125	182.4	0.456
8.0	1735.1	1.126	186.5	0.466
9.0	1737.5	1.128	188.6	0.472
10.0	1735.1	1.126	197.4	0.493
11.0	1736.0	1.127	222.0	0.555
12.0	1740.0	1.129	222.0	0.555
13.0	1729.7	1.123	216.7	0.542
14.0	1730.2	1.123	224.7	0.562
15.0	1733.6	1.125	230.3	0.576
16.0	1734.1	1.125	227.5	0.569
17.0	1734.1	1.125	211.7	0.529
18.0	1733.6	1.125	204.3	0.511
19.0	1733.6	1.125	239.1	0.598
20.0	1726.7	1.121	258.6	0.646
21.0	1727.2	1.121	352.5	0.881

Cruise: Suncoaster Station: NS04-1 date: 10 Nov 94
lat: 26-19.73 N long: 80-03.86 W depth: 17 m

calc for: 27.0 deg C 36.0 o/oo 17.0 m 400 kHz
ref core: 23.5 deg C 79.97 delta-t 400.0 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1538.5	0.999	2.2	0.006
0.0	1545.9	1.004	107.9	0.270
1.0	1703.0	1.106	284.1	0.710
2.0	1759.2	1.143	113.9	0.285
3.0	1757.2	1.141	110.3	0.276
4.0	1757.7	1.142	122.9	0.307
5.0	1762.7	1.145	135.3	0.338
6.0	1764.2	1.146	158.7	0.397
7.0	1760.2	1.143	136.7	0.342
8.0	1764.2	1.146	148.8	0.372
9.0	1763.7	1.146	135.3	0.338
10.0	1760.7	1.144	153.7	0.384
11.0	1758.7	1.142	163.9	0.410
12.0	1757.2	1.141	180.6	0.452
13.0	1763.7	1.146	190.9	0.477
14.0	1752.1	1.138	232.5	0.581

Cruise: Suncoaster Station: NS04-2 date: 10 Nov 94
lat: 26 19.73 N long: 80 03.86 W depth: 17 m

calc for: 27.0 deg C 36.0 o/oo 17.0 m 400 kHz
ref core: 24.0 deg C 79.96 delta-t 387.5 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1538.2	0.999	0.0	0.000
0.0	1542.4	1.002	36.4	0.091
1.0	1753.4	1.139	127.9	0.320
2.0	1754.9	1.140	114.5	0.286
3.0	1755.4	1.140	113.2	0.283
4.0	1760.0	1.143	135.1	0.338
5.0	1765.0	1.147	138.1	0.345
6.0	1763.0	1.145	144.3	0.361
7.0	1767.1	1.148	161.1	0.403
8.0	1764.5	1.146	170.3	0.426
9.0	1760.5	1.144	170.3	0.426
10.0	1759.0	1.143	168.4	0.421
11.0	1763.0	1.145	182.2	0.455
12.0	1757.9	1.142	162.9	0.407
13.0	1750.9	1.137	164.7	0.412
14.0	1765.0	1.147	182.2	0.455
15.0	1764.0	1.146	162.9	0.407
16.0	1765.0	1.147	159.3	0.398
17.0	1757.4	1.142	186.3	0.466

Cruise: Suncoaster Station: NS04-3 date: 10 Nov 94
lat: 26 19.73 N long: 80 03.86 W depth: 17 m

calc for: 27.0 deg C 36.0 o/oo 17.0 m 400 kHz
ref core: 24.0 deg C 79.95 delta-t 400.0 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO		ALPHA(dB/m)	k
-1.0	1538.9	1.000	2.2	0.006	
0.0	1763.5	1.146	201.9	0.505	
1.0	1747.9	1.135	132.4	0.331	
2.0	1752.9	1.139	139.7	0.349	
3.0	1763.5	1.146	145.7	0.364	
4.0	1766.1	1.147	132.4	0.331	
5.0	1763.0	1.145	128.3	0.321	
6.0	1764.0	1.146	135.3	0.338	
7.0	1761.0	1.144	167.4	0.419	
8.0	1774.8	1.153	152.1	0.380	
9.0	1773.7	1.152	145.7	0.364	
10.0	1771.2	1.151	160.4	0.401	
11.0	1751.9	1.138	184.6	0.462	
12.0	1750.4	1.137	229.7	0.574	

Cruise: Suncoaster Station: NS04-4 date: 10 Noc 94
lat: 26 19.73 N long: 80 03.86 W depth: 17 m

calc for: 27.0 deg C 36.0 o/oo 17.0 m 400 kHz
ref core: 24.0 deg C 79.95 delta-t 381.2 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1539.7	1.000	-4.6	-0.011
0.0	1650.9	1.072	124.2	0.310
1.0	1752.4	1.138	110.9	0.277
2.0	1762.5	1.145	110.9	0.277
3.0	1768.1	1.149	131.4	0.328
4.0	1769.6	1.150	140.4	0.351
5.0	1769.1	1.149	135.8	0.340
6.0	1767.6	1.148	140.4	0.351
7.0	1762.0	1.145	143.6	0.359
8.0	1762.0	1.145	162.4	0.406
9.0	1761.0	1.144	197.4	0.494
10.0	1747.9	1.135	207.1	0.518
11.0	1754.4	1.140	202.1	0.505
12.0	1742.5	1.132	237.6	0.594

Cruise: Suncoaster Station: NS05-1 date: 11 Nov 94
lat: 26 19.5 N long: 80 03.9 W depth: 15 m

calc for: 27.0 deg C 36.0 o/oo 15.0 m 400 kHz
ref core: 23.0 deg C 79.87 delta-t 412.5 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1537.1	0.998	2.2	0.005
0.0	1644.6	1.068	173.6	0.434
1.0	1743.2	1.132	191.1	0.478
2.0	1752.2	1.138	156.4	0.391
3.0	1765.3	1.147	131.3	0.328
4.0	1770.9	1.150	115.9	0.290
5.0	1772.4	1.151	114.7	0.287
6.0	1765.8	1.147	158.1	0.395
7.0	1759.7	1.143	170.0	0.425
8.0	1754.7	1.140	187.0	0.467
9.0	1754.2	1.140	195.3	0.488
10.0	1752.2	1.138	193.1	0.483
11.0	1744.7	1.133	195.3	0.488
12.0	1742.2	1.132	215.8	0.539
13.0	1745.2	1.134	288.5	0.721
14.0	1754.7	1.140	353.8	0.885
15.0	1751.2	1.138	256.4	0.641
16.0	1751.7	1.138	213.4	0.533
17.0	1744.7	1.133	251.3	0.628
18.0	1755.7	1.140	226.0	0.565

Cruise: Suncoaster Station: NS05-2 date: 11 Nov 94
lat: 26 19.5 N long: 80 03.91 W depth: 15 m

calc for: 27.0 deg C 36.0 o/oo 15.0 m 400 kHz
ref core: 23.0 deg C 79.87 delta-t 400.0 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1535.9	0.998	0.0	0.000
0.0	1763.3	1.145	184.6	0.462
1.0	1748.2	1.136	128.3	0.321
2.0	1758.7	1.142	119.3	0.298
3.0	1765.3	1.147	132.4	0.331
4.0	1767.3	1.148	132.4	0.331
5.0	1765.3	1.147	141.2	0.353
6.0	1764.8	1.146	147.3	0.368
7.0	1760.2	1.143	145.7	0.364
8.0	1766.8	1.148	153.7	0.384
9.0	1764.8	1.146	158.7	0.397
10.0	1759.7	1.143	169.2	0.423
11.0	1761.7	1.144	193.0	0.483
12.0	1767.8	1.148	195.2	0.488
13.0	1763.8	1.146	197.4	0.493
14.0	1760.7	1.144	219.0	0.547
15.0	1749.7	1.137	239.5	0.599
16.0	1747.2	1.135	309.1	0.773
17.0	1751.7	1.138	282.5	0.706

Cruise: Suncoaster Station: NS05-3 date: 11 Nov 94
lat: 26 19.5 N long: 80 03.91 W depth: 15 m

calc for: 27.0 deg C 36.0 o/oo 15.0 m 400 kHz
ref core: 23.0 deg C 79.90 delta-t 406.2 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1536.7	0.998	4.5	0.011
0.0	1762.8	1.145	216.1	0.540
1.0	1733.4	1.126	162.6	0.406
2.0	1750.2	1.137	211.2	0.528
3.0	1764.3	1.146	180.9	0.452
4.0	1774.0	1.152	166.1	0.415
5.0	1766.8	1.148	180.9	0.452
6.0	1758.7	1.142	253.0	0.632
7.0	1762.8	1.145	235.9	0.590
8.0	1761.2	1.144	223.8	0.559
9.0	1762.8	1.145	211.2	0.528
10.0	1770.4	1.150	231.9	0.580
11.0	1778.6	1.155	211.2	0.528
12.0	1769.9	1.150	213.6	0.534
13.0	1768.9	1.149	191.0	0.477
14.0	1767.3	1.148	186.8	0.467
15.0	1766.8	1.148	193.1	0.483
16.0	1760.7	1.144	218.6	0.547
17.0	1751.2	1.138	229.2	0.573
18.0	1748.7	1.136	213.6	0.534
19.0	1744.2	1.133	216.1	0.540
20.0	1733.4	1.126	263.7	0.659

Cruise: Suncoaster Station: NS05-4 date: 11 Nov 94
lat: 28 19.5 N long: 80 03.91 W depth: 15 m

calc for: 27.0 deg C 36.0 o/oo 15.0 m 400 kHz
ref core: 22.8 deg C 79.90 delta-t 406.2 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1535.9	0.998	0.0	0.000
0.0	1761.6	1.144	188.9	0.472
1.0	1745.6	1.134	144.9	0.362
2.0	1753.1	1.139	136.1	0.340
3.0	1761.6	1.144	123.8	0.309
4.0	1767.7	1.148	137.5	0.344
5.0	1771.8	1.151	149.5	0.374
6.0	1771.8	1.151	146.4	0.366
7.0	1774.4	1.153	154.3	0.386
8.0	1761.6	1.144	237.6	0.594
9.0	1746.6	1.135	229.2	0.573
10.0	1738.2	1.129	234.7	0.587
11.0	1744.6	1.133	221.2	0.553
12.0	1756.1	1.141	213.6	0.534
13.0	1759.1	1.143	216.1	0.540
14.0	1762.1	1.145	213.6	0.534
15.0	1772.8	1.152	218.6	0.547
16.0	1759.1	1.143	270.9	0.677
17.0	1770.3	1.150	208.8	0.522
18.0	1769.2	1.149	182.8	0.457
19.0	1776.4	1.154	182.8	0.457
20.0	1783.6	1.159	195.2	0.488

Cruise: Suncoaster Station: NS06-1 date: 11 Nov 94
lat: 26 18.58 N long: 80 02.99 W depth: 20 m

calc for: 27.0 deg C 36.0 o/oo 20.0 m 400 kHz
ref core: 23.0 deg C 79.94 delta-t 393.8 H 0.001 V/D
sample core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1539.1	1.000	-4.5	-0.011
0.0	1669.3	1.084	394.3	0.986
1.0	1710.3	1.111	269.4	0.673
2.0	1727.6	1.122	428.8	1.072
3.0	1721.8	1.118	219.3	0.548
4.0	1709.8	1.111	230.3	0.576
5.0	1692.3	1.099	242.2	0.605
6.0	1682.6	1.093	266.4	0.666
7.0	1679.8	1.091	288.6	0.721
8.0	1670.2	1.085	319.1	0.798
9.0	1677.5	1.090	347.2	0.868
10.0	1668.0	1.083	363.7	0.909
11.0	1626.8	1.057	583.1	1.458
12.0	1623.0	1.054	579.6	1.449
13.0	1641.2	1.066	532.1	1.330
14.0	1660.3	1.078	440.8	1.102
15.0	1647.4	1.070	573.2	1.433
16.0	1662.1	1.080	756.5	1.891
17.0	1662.5	1.080	739.3	1.848
18.0	1677.5	1.090	616.4	1.541

Cruise: Suncoaster Station: NS06-2 date: 11 Nov 94
lat: 26 18.58 N long: 80 02.99 W depth: 20 m

calc for: 27.0 deg C 36.0 o/oo 20.0 m 400 kHz
ref core: 22.5 deg C 79.92 delta-t 400.0 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1537.1	0.998	-2.2	-0.006
0.0	1548.8	1.006	162.1	0.405
1.0	1692.6	1.099	213.9	0.535
2.0	1704.3	1.107	224.3	0.561
3.0	1690.3	1.098	296.1	0.740
4.0	1689.8	1.098	305.3	0.763
5.0	1704.3	1.107	268.6	0.672
6.0	1713.4	1.113	262.9	0.657
7.0	1723.0	1.119	268.6	0.672
8.0	1723.5	1.120	221.6	0.554
9.0	1721.1	1.118	219.0	0.547
10.0	1715.8	1.114	199.6	0.499
11.0	1712.9	1.113	201.9	0.505
12.0	1715.8	1.114	227.0	0.567
13.0	1720.1	1.117	227.0	0.567
14.0	1715.3	1.114	247.6	0.619
15.0	1694.9	1.101	371.8	0.930
16.0	1691.7	1.099	448.1	1.120
17.0	1670.1	1.085	504.6	1.262
18.0	1663.3	1.080	557.6	1.394
19.0	1669.6	1.085	557.6	1.394

Cruise: Suncoaster Station: NS06-3 date: 11 Nov 94
lat: 26 18.58 N long: 80 02.99 W depth: 20 m

calc for: 27.0 deg C 36.0 o/oo 20.0 m 400 kHz
ref core: 22.5 deg C 79.95 delta-t 406.2 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1537.5	0.999	0.0	0.000
0.0	1657.9	1.077	243.0	0.607
1.0	1708.1	1.110	234.7	0.587
2.0	1714.8	1.114	208.8	0.522
3.0	1716.7	1.115	201.8	0.505
4.0	1717.7	1.116	234.7	0.587
5.0	1716.3	1.115	246.6	0.617
6.0	1714.3	1.114	234.7	0.587
7.0	1713.9	1.113	259.6	0.649
8.0	1717.7	1.116	259.6	0.649
9.0	1715.3	1.114	243.6	0.609
10.0	1715.3	1.114	572.3	1.431
11.0	1721.1	1.118	243.6	0.609
12.0	1719.6	1.117	243.6	0.609
13.0	1720.1	1.117	266.5	0.666
14.0	1716.7	1.115	273 8	0.685
15.0	1713.4	1.113	273.8	0.685
16.0	1715.8	1.114	293.0	0.733
17.0	1715.3	1.114	293.0	0.733
18.0	1710.5	1.111	309.4	0.774

Cruise: Suncoaster Station: NS06-4 date: 11 Nov 94
lat: 26 19.48 N long: 80 03.80 W depth: 19 m

calc for: 27.0 deg C 36.0 o/oo 19.0 m 400 kHz
ref core: 22.5 deg C 79.97 delta-t 412.5 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1536.7	0.998	0.0	0.000
0.0	1756.5	1.141	509.0	1.273
1.0	1713.4	1.113	185.0	0.463
2.0	1706.2	1.108	199.6	0.499
3.0	1703.4	1.106	213.4	0.533
4.0	1694.9	1.101	231.3	0.578
5.0	1686.5	1.096	228.6	0.572
6.0	1682.8	1.093	242.7	0.607
7.0	1659.7	1.078	315.5	0.789
8.0	1648.5	1.071	343.8	0.860
9.0	1666.4	1.082	370.3	0.926
10.0	1681.9	1.093	319.5	0.799

Cruise: Suncoaster Station: NS07-1 date: 11 Nov 94
lat: 26 19.48 N long: 80 03.80 W depth: 19 m

calc for: 27.0 deg C 36.0 o/oo 19.0 m 400 kHz
ref core: 22.5 deg C 79.94 delta-t 412.5 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1537.5	0.999	2.2	0.005
0.0	1755.0	1.140	247.6	0.619
1.0	1740.1	1.130	119.5	0.299
2.0	1745.5	1.134	141.1	0.353
3.0	1755.0	1.140	147.0	0.368
4.0	1755.5	1.140	158.1	0.395
5.0	1754.0	1.139	193.2	0.483
6.0	1749.0	1.136	234.1	0.585
7.0	1748.5	1.136	231.4	0.579
8.0	1757.0	1.141	218.2	0.546
9.0	1757.5	1.142	193.2	0.483
10.0	1759.5	1.143	193.2	0.483
11.0	1759.0	1.143	210.9	0.527
12.0	1755.5	1.140	206.3	0.516
13.0	1754.5	1.140	201.8	0.504
14.0	1756.0	1.141	195.2	0.488
15.0	1757.5	1.142	195.2	0.488
16.0	1760.5	1.144	187.0	0.468
17.0	1762.5	1.145	189.0	0.472
18.0	1761.0	1.144	187.0	0.468
19.0	1759.5	1.143	191.1	0.478
20.0	1766.6	1.148	195.2	0.488
21.0	1759.5	1.143	225.9	0.565
22.0	1759.5	1.143	239.7	0.599
23.0	1762.5	1.145	231.4	0.579
24.0	1762.5	1.145	231.4	0.579

Cruise: Suncoaster Station: NS07-2 date: 11 Nov 94
lat: 26 19.48 N long: 80 03.80 W depth: 19 m

calc for: 27.0 deg C 36.0 o/oo 19.0 m 400 kHz
ref core: 22.5 deg C 79.95 delta-t 412.5 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1538.7	0.999	2.2	0.005
0.0	1759.0	1.143	147.0	0.368
1.0	1757.0	1.141	122.1	0.305
2.0	1762.5	1.145	141.1	0.353
3.0	1759.0	1.143	131.3	0.328
4.0	1759.0	1.143	153.2	0.383
5.0	1759.0	1.143	153.2	0.383
6.0	1758.5	1.142	154.8	0.387
7.0	1757.5	1.142	158.1	0.395
8.0	1755.5	1.140	163.1	0.408
9.0	1756.0	1.141	179.2	0.448
10.0	1759.0	1.143	177.3	0.443
11.0	1757.5	1.142	183.0	0.458
12.0	1760.5	1.144	215.8	0.539
14.0	1750.5	1.137	189.0	0.473
15.0	1744.0	1.133	177.3	0.443
16.0	1746.0	1.134	177.3	0.443
17.0	1745.5	1.134	187.0	0.467
18.0	1748.0	1.135	191.1	0.478
19.0	1754.5	1.140	189.0	0.473
20.0	1750.5	1.137	191.1	0.478
21.0	1740.6	1.131	183.0	0.458
22.0	1740.1	1.130	185.0	0.463
23.0	1738.6	1.129	263.1	0.658

Cruise: Suncoaster Station: NS07-3 date: 11 Nov 94
lat: 26 19.48 N long: 80 03.80 W depth: 19 m

calc for: 27.0 deg C 36.0 o/oo 19.0 m 400 kHz
ref core: 22.5 deg C 79.95 delta-t 406.2 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1538.3	0.999	4.5	0.011
0.0	1541.8	1.001	90.2	0.225
1.0	1745.0	1.133	169.6	0.424
2.0	1749.0	1.136	140.4	0.351
3.0	1749.0	1.136	140.4	0.351
4.0	1753.0	1.139	171.4	0.429
5.0	1750.0	1.137	180.9	0.452
6.0	1750.0	1.137	167.8	0.420
7.0	1750.5	1.137	147.9	0.370
8.0	1753.5	1.139	167.8	0.420
9.0	1755.5	1.140	173.3	0.433
10.0	1749.5	1.136	173.3	0.433
11.0	1752.5	1.138	178.9	0.447
12.0	1751.5	1.138	173.3	0.433
13.0	1755.5	1.140	173.3	0.433
14.0	1750.5	1.137	166.1	0.415
15.0	1751.0	1.137	193.1	0.483
16.0	1757.0	1.141	226.5	0.566
17.0	1760.5	1.144	186.8	0.467
18.0	1761.5	1.144	226.5	0.566
19.0	1759.5	1.143	259.6	0.649

Cruise: Suncoaster Station: NS07-4 date: 11 Nov 94
lat: 26 19.48 N long: 80 03.80 W depth: 19 m

calc for: 27.0 deg C 36.0 o/oo 19.0 m 400 kHz
ref core: 22.5 deg C 79.95 delta-t 406.2 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1538.3	0.999	0.0	0.000
0.0	1648.5	1.071	151.1	3.776
1.0	1748.0	1.135	118.7	2.966
2.0	1754.0	1.139	129.1	3.228
3.0	1758.0	1.142	141.9	3.547
4.0	1752.5	1.138	146.4	3.660
5.0	1742.0	1.132	171.4	4.286
6.0	1740.1	1.130	216.1	5.403
7.0	1736.6	1.128	240.6	6.014
8.0	1747.0	1.135	151.1	3.776
9.0	1747.0	1.135	146.4	3.660
10.0	1752.5	1.138	160.9	4.022
11.0	1767.1	1.148	169.6	4.240
12.0	1765.6	1.147	155.9	3.897
13.0	1766.6	1.148	160.9	4.022
14.0	1769.6	1.150	159.2	3.980
15.0	1774.2	1.152	164.3	4.108
16.0	1777.8	1.155	175.1	4.378
17.0	1772.2	1.151	186.8	4.671
18.0	1765.1	1.147	180.9	4.522
19.0	1764.1	1.146	182.8	4.571
20.0	1761.5	1.144	191.0	4.774
21.0	1769.1	1.149	191.0	4.774

Cruise: Suncoaster Station: ns1 date: 8 Nov 94
lat: 26-15.5 N long: 80-04.8 W depth: .5 m

calc for: 27.0 deg C 36.0 o/oo 0.5 m 400 kHz
ref core: 24.0 deg C 79.87 delta-t 387.5 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1535.8	0.998	0.0	0.000
0.0	1651.7	1.073	154.2	0.385
1.0	1804.0	1.172	206.9	0.517
2.0	1825.5	1.186	448.9	1.122
3.0	1842.0	1.197	470.7	1.177
4.0	1800.3	1.170	520.7	1.302
5.0	1772.2	1.151	295.2	0.738
6.0	1762.0	1.145	259.8	0.650
7.0	1772.2	1.151	539.8	1.349

Cruise: Suncoaster Station: NS2 date: 8 Nov 94
lat: 26 15.5 N long: 80 04.8 W depth: 0.5 m

calc for: 27.0 deg C 36.0 o/oo 0.5 m 400 kHz
ref core: 24.0 deg C 79.88 delta-t 393.8 H 0.001 V/D
smp core: 36.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1536.1	0.998	0.0	0.000
0.0	1652.9	1.074	143.5	0.359
1.0	1782.7	1.158	108.0	0.270
2.0	1784.3	1.159	167.0	0.417
3.0	1654.3	1.075	564.0	1.410

Cruise: Suncoaster Station: ns4 date: 8 Nov 94
lat: 26-15 N long: 80-04.8 W depth: 0.5 m

calc for: 27.0 deg C 35.0 o/oo 0.5 m 400 kHz
ref core: 23.8 deg C 79.90 delta-t 393.8 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1535.0	0.998	2.3	0.006
0.0	1544.7	1.004	188.6	0.472
17.0	1690.0	1.099	539.5	1.349

Cruise: Suncoaster Station: ns5 date: 8 Nov 94
lat: 26-15.5 N long: 80-04.8 W depth: 0.5 m

calc for: 27.0 deg C 35.0 o/oo 0.5 m 400 kHz
ref core: 23.8 deg C 79.90 delta-t 384.4 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1536.6	0.999	-2.3	-0.006
0.0	1546.6	1.006	185.2	0.463
1.0	1803.9	1.173	349.0	0.873
2.0	1787.1	1.162	161.7	0.404
3.0	1780.9	1.158	95.3	0.238
4.0	1783.4	1.159	84.4	0.211
5.0	1781.9	1.158	90.8	0.227
6.0	1776.7	1.155	149.6	0.374
7.0	1751.8	1.139	290.4	0.726
8.0	1728.6	1.124	255.8	0.640
9.0	1769.0	1.150	315.7	0.789
10.0	1796.0	1.168	398.3	0.996
11.0	1597.0	1.038	396.4	0.991
12.0	1819.5	1.183	400.2	1.000
13.0	1799.2	1.170	210.7	0.527
14.0	1803.9	1.173	414.4	1.036
17.0	1592.5	1.035	536.0	1.340

Cruise: Suncoaster Station: ns6 date: 8 Nov 94
lat: 26-15.5 N long: 80-04.8 W depth: 0.5 m

calc for: 27.0 deg C 35.0 o/oo 0.5 m 400 kHz
ref core: 23.8 deg C 79.92 delta-t 381.2 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1536.9	0.999	-2.3	-0.006
0.0	1648.2	1.072	108.4	0.271
1.0	1781.4	1.158	140.4	0.351
2.0	1753.3	1.140	283.9	0.710
3.0	1745.8	1.135	197.4	0.493
4.0	1758.4	1.143	142.0	0.355
5.0	1759.4	1.144	169.9	0.425
6.0	1757.9	1.143	166.0	0.415
7.0	1750.3	1.138	204.6	0.511
8.0	1727.6	1.123	593.5	1.484
9.0	1677.5	1.091	506.1	1.265
10.0	1786.6	1.162	146.9	0.367
11.0	1677.5	1.091	506.1	1.265
12.0	1774.1	1.153	110.9	0.277
13.0	1776.2	1.155	98.7	0.247
14.0	1772.1	1.152	101.0	0.253
15.0	1754.3	1.141	175.8	0.440
16.0	1756.9	1.142	240.7	0.602
17.0	1773.6	1.153	190.5	0.476
18.0	1773.6	1.153	162.3	0.406
19.0	1794.4	1.167	157.0	0.392

APPENDIX D.

Raw data from the Indian Rocks Beach and Lower Tampa Bay study areas.

Cruise: TBAC Station: IRB6-1 date: 3 JUN 95
lat: 27-56.34 N long: 82-54.47 W depth: 7 m

calc for: 28.5 deg C 35.0 o/oo 7.0 m 400 kHz
ref core: 24.2 deg C 82.56 delta-t 290.6 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1539.0	0.998	0.0	0.000
0.0	1455.4	0.944	205.3	0.513
1.0	1725.5	1.119	196.5	0.491
2.0	1740.7	1.129	197.7	0.494
3.0	1757.1	1.140	161.1	0.403
4.0	1760.1	1.142	143.3	0.358
5.0	1761.2	1.143	163.5	0.409
6.0	1755.1	1.139	158.8	0.397
7.0	1762.2	1.143	187.1	0.468
8.0	1759.1	1.141	205.3	0.513
9.0	1746.1	1.133	358.5	0.896
10.0	1709.6	1.109	405.2	1.013
11.0	1702.5	1.104	619.4	1.549
12.0	1694.5	1.099	317.5	0.794
13.0	1695.9	1.100	280.2	0.700

Cruise: TBAC Station: IRB6-2 date: 3 JUN 95
lat: 27-56.34 N long: 82-54.47 W depth: 7 m

calc for: 28.5 deg C 35.0 o/oo 7.0 m 400 kHz
ref core: 27.2 deg C 82.58 delta-t 290.6 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1541.0	1.000	-1.5	-0.004
0.0	1542.2	1.000	60.0	0.150
1.0	1773.8	1.151	370.4	0.926
2.0	1725.2	1.119	420.5	1.051
3.0	1710.7	1.110	439.4	1.098
4.0	1726.1	1.120	453.5	1.134
5.0	1746.9	1.133	543.1	1.358
6.0	1699.7	1.103	873.4	2.184
7.0	1681.5	1.091	1005.0	2.513
8.0	1686.1	1.094	1098.2	2.745
13.0	1659.5	1.077	1068.6	2.671
14.0	1692.6	1.098	744.3	1.861
15.0	1721.3	1.117	484.3	1.211
16.0	1691.2	1.097	569.9	1.425
17.0	1681.5	1.091	795.4	1.988
18.0	1676.8	1.088	1208.3	3.021

Cruise: TBAC Station: IRB6-3 date: 3 JUN 95
lat: 27-56.34 N long: 82-54.47 W depth: 7 m

calc for: 28.5 deg C 35.0 o/oo 7.0 m 400 kHz
ref core: 24.8 deg C 82.58 delta-t 284.4 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1538.3	0.998	1.6	0.004
0.0	1543.3	1.001	178.4	0.446
1.0	1709.9	1.109	247.5	0.619
2.0	1730.2	1.122	219.3	0.548
3.0	1721.9	1.117	321.7	0.804
4.0	1739.5	1.128	321.7	0.804
5.0	1739.5	1.128	256.7	0.642
6.0	1746.9	1.133	195.8	0.490
7.0	1745.4	1.132	181.1	0.453
8.0	1734.6	1.125	223.0	0.558
9.0	1724.3	1.119	234.8	0.587
10.0	1714.2	1.112	252.0	0.630

Cruise: TBAC Station: IRB6-4 date: 3 JUN 95
lat: 27-56.34 N long: 82-54.47 W depth: 7 m

calc for: 28.5 deg C 35.0 o/oo 7.0 m 400 kHz
ref core: 25.0 deg C 82.59 delta-t 284.4 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1537.9	0.998	1788.2	4.470
0.0	1549.6	1.005	184.0	0.460
1.0	1701.0	1.103	261.5	0.654
2.0	1721.0	1.116	314.4	0.786
3.0	1710.5	1.110	468.0	1.170
4.0	1699.1	1.102	529.9	1.325
5.0	1719.1	1.115	397.0	0.993
6.0	1713.3	1.111	342.7	0.857
7.0	1673.1	1.085	543.6	1.359
8.0	1685.1	1.093	431.3	1.078
9.0	1701.9	1.104	335.9	0.840
10.0	1702.9	1.105	295.8	0.739
11.0	1697.7	1.101	335.9	0.840

Cruise: TBAC Station: LTB1-1 date: 4 JUN 95
lat: 27-33.50 N long: 82-41.20 W depth: 5 m

calc for: 27.7 deg C 33.0 o/oo 5.0 m 400 kHz
ref core: 25.5 deg C 82.56 delta-t 300.0 H 0.001 V/D
smp core: 33.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1535.2	0.998	0.0	0.000
0.0	1539.1	1.001	268.2	0.670
1.0	1685.4	1.096	359.3	0.898
2.0	1691.9	1.100	397.2	0.993
3.0	1692.4	1.101	584.7	1.462
4.0	1685.4	1.096	821.0	2.052
5.0	1655.8	1.077	1048.6	2.622
6.0	1620.7	1.054	681.7	1.704
7.0	1697.1	1.104	630.2	1.575
8.0	1695.7	1.103	394.8	0.987
9.0	1696.2	1.103	387.8	0.970
10.0	1708.5	1.111	332.4	0.831
11.0	1696.2	1.103	407.2	1.018
12.0	1695.7	1.103	352.1	0.880
13.0	1699.5	1.105	381.2	0.953

Cruise: TBAC Station: LTB1-2 date: 4 JUN 95
lat: 27-33.50 N long: 82-41.20 W depth: 5 m

calc for: 27.7 deg C 33.0 o/oo 5.0 m 400 kHz
ref core: 25.5 deg C 82.56 delta-t 300.0 H 0.001 V/D
smp core: 33.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1539.9	1.001	-1.5	-0.004
0.0	1540.3	1.002	66.9	0.167
1.0	1669.3	1.086	280.4	0.701
2.0	1686.8	1.097	316.5	0.791
3.0	1721.5	1.120	357.4	0.894
4.0	1729.2	1.125	280.4	0.701
5.0	1740.1	1.132	260.6	0.651
6.0	1747.0	1.136	223.4	0.558
7.0	1764.2	1.147	229.2	0.573
8.0	1756.1	1.142	434.2	1.085
9.0	1702.8	1.107	821.0	2.052
10.0	1702.8	1.107	584.7	1.462
11.0	1714.7	1.115	348.6	0.871
12.0	1727.3	1.123	333.9	0.835
13.0	1733.7	1.127	276.2	0.690
14.0	1742.1	1.133	319.2	0.798
15.0	1729.7	1.125	498.4	1.246
16.0	1754.0	1.141	440.6	1.102
17.0	1752.5	1.140	488.8	1.222
18.0	1721.0	1.119	469.6	1.174

Cruise: TBAC
lat: 27-33.50 N

Station: LTB1-3
long: 82-41.20 W

date: 4 JUN 95
depth: 5 m

calc for: 27.7 deg C 33.0 o/oo 5.0 m 400 kHz
ref core: 25.5 deg C 82.56 delta-t 303.1 H 0.001 V/D
smp core: 33.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1537.2	1.000	1.5	0.004
0.0	1538.7	1.001	295.2	0.738
1.0	1637.1	1.065	497.3	1.243
2.0	1678.9	1.092	539.0	1.348
3.0	1679.9	1.093	457.6	1.144
4.0	1709.9	1.112	323.5	0.809
5.0	1708.5	1.111	275.6	0.689
6.0	1712.8	1.114	286.2	0.715
7.0	1722.9	1.121	304.9	0.762
8.0	1726.3	1.123	288.4	0.721
9.0	1729.7	1.125	297.6	0.744
10.0	1717.6	1.117	309.9	0.775
11.0	1705.6	1.109	277.7	0.694
12.0	1706.1	1.110	275.6	0.689
13.0	1704.2	1.108	262.0	0.655
14.0	1705.1	1.109	258.4	0.646
15.0	1715.2	1.115	262.0	0.655
16.0	1702.3	1.107	256.6	0.642
17.0	1714.2	1.115	307.4	0.768
18.0	1722.9	1.121	323.5	0.809
19.0	1739.1	1.131	461.2	1.153
20.0	1726.8	1.123	575.9	1.440
21.0	1710.4	1.112	723.8	1.809
22.0	1698.5	1.105	623.2	1.558
23.0	1705.1	1.109	632.8	1.582

Cruise: TBAC Station: LTB1-4 date: 4 JUN 95
lat: 27-33.50 N long: 82-41.20 W depth: 5 m

calc for: 27.7 deg C 33.0 o/oo 5.0 m 400 kHz
ref core: 25.5 deg C 82.58 delta-t 303.1 H 0.001 V/D
smp core: 33.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1538.3	1.000	1.5	0.004
0.0	1548.1	1.007	149.3	0.373
1.0	1660.7	1.080	323.5	0.809
2.0	1683.6	1.095	351.8	0.879
3.0	1685.9	1.096	443.7	1.109
4.0	1674.3	1.089	921.2	2.303
5.0	1457.7	0.948	692.6	1.731
6.0	1681.7	1.094	651.2	1.628
7.0	1684.5	1.096	438.8	1.097
8.0	1706.1	1.110	382.7	0.957
9.0	1709.0	1.111	322.1	0.805
10.0	1708.5	1.111	288.4	0.721
11.0	1717.6	1.117	295.2	0.738
12.0	1728.3	1.124	286.2	0.715
13.0	1727.3	1.123	297.6	0.744
14.0	1716.1	1.116	267.7	0.669
15.0	1711.8	1.113	269.6	0.674
16.0	1706.1	1.110	256.6	0.642
17.0	1686.3	1.097	295.2	0.738

Cruise: TBAC Station: LTB2-1 date: 4 JUN 95
lat: 27-32.99 N long: 82-41.20 W depth: 5 m

calc for: 27.8 deg C 34.0 o/oo 5.0 m 400 kHz
ref core: 25.5 deg C 82.60 delta-t 296.9 H 0.001 V/D
smp core: 34.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1539.1	1.000	-1.5	-0.004
0.0	1662.4	1.080	266.7	0.667
1.0	1682.1	1.093	169.0	0.422
2.0	1703.6	1.107	214.9	0.537
3.0	1718.5	1.117	184.5	0.461
4.0	1727.7	1.123	198.9	0.497
5.0	1725.3	1.121	219.0	0.548
6.0	1729.2	1.124	203.2	0.508
7.0	1732.6	1.126	205.7	0.514
8.0	1739.0	1.130	214.9	0.537
9.0	1737.0	1.129	208.3	0.521
10.0	1743.5	1.133	219.0	0.548
11.0	1743.9	1.133	217.6	0.544
12.0	1744.9	1.134	235.3	0.588

Cruise: TBAC Station: LTB2-2 date: 4 JUN 95
lat: 27-32.99 N long: 82-41.20 W depth: 5 m

calc for: 27.8 deg C 34.0 o/oo 5.0 m 400 kHz
ref core: 25.6 deg C 82.58 delta-t 303.1 H 0.001 V/D
smp core: 34.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1539.8	1.001	1.5	0.004
0.0	1658.9	1.078	191.9	0.480
1.0	1715.6	1.115	174.4	0.436
2.0	1733.6	1.127	190.2	0.476
3.0	1740.0	1.131	204.9	0.512
4.0	1736.6	1.128	201.9	0.505
5.0	1732.6	1.126	190.2	0.476
6.0	1720.0	1.118	224.8	0.562
7.0	1725.3	1.121	238.3	0.596
8.0	1736.6	1.128	229.2	0.573
9.0	1740.0	1.131	212.6	0.531
10.0	1742.0	1.132	219.3	0.548
11.0	1719.0	1.117	313.9	0.785
12.0	1693.3	1.100	301.2	0.753
13.0	1676.1	1.089	284.0	0.710
14.0	1673.4	1.087	295.2	0.738
15.0	1672.9	1.087	265.8	0.664
16.0	1671.6	1.086	271.6	0.679
17.0	1679.4	1.091	355.3	0.888
18.0	1689.1	1.098	281.8	0.705
19.0	1690.0	1.098	295.2	0.738
20.0	1700.8	1.105	414.0	1.035

Cruise: TBAC Station: LTB2-3 date: 4 JUN 95
lat: 27-32.99 N long: 82-41.20 W depth: 5 m

calc for: 27.8 deg C 34.0 o/oo 5.0 m 400 kHz
ref core: 25.6 deg C 82.59 delta-t 300.0 H 0.001 V/D
smp core: 34.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1537.9	0.999	1.5	0.004
0.0	1655.3	1.076	139.7	0.349
1.0	1679.4	1.091	229.2	0.573
2.0	1709.9	1.111	239.9	0.600
3.0	1729.2	1.124	180.6	0.452
4.0	1737.6	1.129	183.3	0.458
5.0	1743.0	1.133	183.3	0.458
6.0	1743.0	1.133	180.6	0.452
7.0	1733.6	1.127	197.4	0.493
8.0	1732.6	1.126	183.3	0.458
9.0	1735.1	1.127	180.6	0.452
10.0	1738.1	1.129	183.3	0.458
11.0	1739.0	1.130	213.1	0.533

Cruise: TBAC Station: LTB2-4 date: 4 JUN 95
lat: 27-32.99 N long: 82-41.20 W depth: 5 m

calc for: 27.8 deg C 34.0 o/oo 5.0 m 400 kHz
ref core: 25.5 deg C 82.56 delta-t 303.1 H 0.001 V/D
smp core: 34.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1537.5	0.999	1.5	0.004
0.0	1647.7	1.071	267.7	0.669
1.0	1697.5	1.103	212.6	0.531
2.0	1715.1	1.115	195.3	0.488
3.0	1723.3	1.120	174.4	0.436
4.0	1729.2	1.124	201.9	0.505
5.0	1725.3	1.121	208.1	0.520
6.0	1719.9	1.118	211.3	0.528
7.0	1715.6	1.115	198.9	0.497
8.0	1730.1	1.124	217.9	0.545
9.0	1728.2	1.123	211.3	0.528
10.0	1735.5	1.128	208.1	0.520
11.0	1743.9	1.133	233.6	0.584
12.0	1732.6	1.126	230.6	0.577
13.0	1727.2	1.122	269.6	0.674

Cruise: TBAC Station: LTB3-1 date: 4 JUN 95
lat: 27-33.00 N long: 82-40.50 W depth: 5 m

calc for: 27.7 deg C 34.0 o/oo 5.0 m 400 kHz
ref core: 25.5 deg C 82.59 delta-t 303.1 H 0.001 V/D
smp core: 34.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1539.2	1.000	0.0	0.000
0.0	1664.5	1.082	233.6	0.584
1.0	1697.3	1.103	190.2	0.476
2.0	1702.0	1.106	198.9	0.497
3.0	1715.8	1.115	208.1	0.520
4.0	1729.4	1.124	239.8	0.600
5.0	1748.7	1.136	230.6	0.577
6.0	1756.7	1.142	226.3	0.566
7.0	1751.2	1.138	241.4	0.604
8.0	1757.2	1.142	236.7	0.592
9.0	1762.8	1.146	215.2	0.538
10.0	1745.2	1.134	208.7	0.522
11.0	1739.2	1.130	230.6	0.577
12.0	1737.8	1.129	246.3	0.616
13.0	1724.0	1.120	307.4	0.768

Cruise: TBAC Station: LTB3-2 date: 4 JUN 95
lat: 27-33.00 N long: 82-40.50 W depth: 5 m

calc for: 27.7 deg C 34.0 o/oo 5.0 m 400 kHz
ref core: 26.8 deg C 82.63 delta-t 287.5 H 0.001 V/D
smp core: 34.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1536.0	0.998	0.0	0.000
0.0	1658.3	1.078	166.9	0.417
1.0	1676.5	1.090	272.2	0.681
2.0	1677.9	1.090	230.7	0.577
3.0	1732.6	1.126	315.9	0.790
4.0	1763.2	1.146	182.3	0.456
5.0	1775.0	1.154	171.9	0.430
6.0	1778.6	1.156	177.2	0.443
7.0	1782.7	1.159	185.5	0.464
8.0	1782.2	1.158	182.7	0.457

Cruise: TBAC Station: LTB3-3 date: 4 JUN 95
lat: 27-33.00 N long: 82-40.50 W depth: 5 m

calc for: 27.7 deg C 34.0 o/oo 5.0 m 400 kHz
ref core: 26.8 deg C 82.62 delta-t 287.5 H 0.001 V/D
smp core: 34.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1537.2	0.999	0.0	0.000
0.0	1659.2	1.078	148.2	0.370
1.0	1695.6	1.102	364.7	0.912
2.0	1712.2	1.113	226.1	0.565
3.0	1729.7	1.124	169.4	0.423
4.0	1740.0	1.131	171.9	0.430
5.0	1764.2	1.147	166.9	0.417
6.0	1771.9	1.152	182.7	0.457
7.0	1781.2	1.158	429.7	1.074
9.0	1704.6	1.108	482.7	1.207
10.0	1728.2	1.123	274.3	0.686
11.0	1737.1	1.129	247.3	0.618
12.0	1742.5	1.132	249.1	0.623
13.0	1740.0	1.131	213.1	0.533
14.0	1745.0	1.134	233.9	0.585
15.0	1727.7	1.123	283.1	0.708
16.0	1718.5	1.117	280.8	0.702
17.0	1716.6	1.116	360.8	0.902
18.0	1709.8	1.111	327.9	0.820
19.0	1712.7	1.113	280.8	0.702
20.0	1721.4	1.119	256.4	0.641
21.0	1728.7	1.124	272.2	0.681
22.0	1717.0	1.116	254.5	0.636
23.0	1707.4	1.110	256.4	0.641
24.0	1705.5	1.108	313.2	0.783

25.0	1720.4	1.118	287.7	0.719
26.0	1741.0	1.132	292.4	0.731
27.0	1738.1	1.130	297.3	0.743
28.0	1742.5	1.132	280.8	0.702
29.0	1761.1	1.145	252.7	0.632
30.0	1756.6	1.142	262.1	0.655
31.0	1753.5	1.140	316.0	0.790

Cruise: TBAC Station: LTB3-4 date: 4 JUN 95
lat: 27-33.00 N long: 82-40.50 W depth: 5 m

calc for: 27.7 deg C 34.0 o/oo 5.0 m 400 kHz
ref core: 26.8 deg C 82.61 delta-t 290.6 H 0.001 V/D
smp core: 34.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1537.6	0.999	0.0	0.000
0.0	1767.8	1.149	263.6	0.659
1.0	1723.3	1.120	178.8	0.447
2.0	1727.7	1.123	200.2	0.500
3.0	1742.0	1.132	188.2	0.471
4.0	1758.6	1.143	165.9	0.415
5.0	1767.8	1.149	165.9	0.415
6.0	1767.8	1.149	184.2	0.461
7.0	1764.7	1.147	189.9	0.475
8.0	1756.6	1.142	202.1	0.505
9.0	1757.1	1.142	202.1	0.505
10.0	1756.1	1.141	187.1	0.468
11.0	1755.1	1.141	215.3	0.538
12.0	1752.0	1.139	232.3	0.581
13.0	1739.6	1.131	291.6	0.729
14.0	1723.3	1.120	294.0	0.735
15.0	1717.0	1.116	275.8	0.690
16.0	1730.2	1.124	306.6	0.766
17.0	1740.5	1.131	261.7	0.654
18.0	1736.6	1.129	230.7	0.577
19.0	1736.6	1.129	294.0	0.735
20.0	1744.0	1.133	428.1	1.070
21.0	1748.0	1.136	564.9	1.412
22.0	1733.6	1.127	661.0	1.653
23.0	1715.6	1.115	498.8	1.247

Cruise: TBAC Station: LTB4-1 date: 4 JUN 95
lat: 27-33.OO N long: 82-40.00 W depth: 5 m

calc for: 27.7 deg C 34.0 o/oo 5.0 m 400 kHz
ref core: 26.8 deg C 82.60 delta-t 290.6 H 0.001 V/D
smp core: 34.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1535.5	0.998	0.0	0.000
0.0	1768.1	1.149	233.8	0.585
1.0	1727.5	1.123	210.5	0.526
2.0	1697.3	1.103	181.5	0.454
3.0	1689.8	1.098	205.3	0.513
4.0	1689.3	1.098	223.2	0.558
5.0	1711.6	1.112	240.3	0.601
6.0	1739.9	1.131	210.5	0.526
7.0	1748.3	1.136	204.0	0.510
8.0	1748.8	1.137	207.9	0.520
9.0	1741.8	1.132	206.6	0.516
10.0	1737.4	1.129	256.0	0.640
11.0	1729.5	1.124	271.7	0.679
12.0	1750.3	1.138	261.7	0.654
13.0	1747.3	1.136	261.7	0.654

Cruise: TBAC Station: LTB4-2 date: 4 JUN 95
lat: 27-33.00 N long: 82-40.00 W depth: 5 m

calc for: 27.7 deg C 34.0 o/oo 5.0 m 400 kHz
ref core: 26.8 deg C 82.61 delta-t 290.6 H 0.001 V/D
smp core: 34.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1537.0	0.999	0.0	0.000
0.0	1544.4	1.004	64.8	0.162
1.0	1658.6	1.078	202.7	0.507
2.0	1676.8	1.090	263.6	0.659
3.0	1733.4	1.127	267.6	0.669
4.0	1742.3	1.132	213.3	0.533
5.0	1755.9	1.141	223.2	0.558
6.0	1772.2	1.152	201.4	0.504
7.0	1771.7	1.151	226.1	0.565
8.0	1750.3	1.138	286.9	0.717
9.0	1739.9	1.131	340.7	0.852
10.0	1730.5	1.125	498.8	1.247
11.0	1715.4	1.115	749.9	1.875
14.0	1675.4	1.089	779.3	1.948
15.0	1678.2	1.091	526.8	1.317
16.0	1685.1	1.095	465.1	1.163
17.0	1678.6	1.091	434.4	1.086
18.0	1658.6	1.078	530.0	1.325
19.0	1674.5	1.088	613.5	1.534
20.0	1704.4	1.108	390.3	0.976

Cruise: TBAC Station: LTB4-3 date: 4 JUN 95
lat: 27-33.00 N long: 82-40.00 W depth: 5 m

calc for: 27.7 deg C 34.0 o/oo 5.0 m 400 kHz
ref core: 26.8 deg C 82.64 delta-t 290.6 H 0.001 V/D
smp core: 34.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1540.1	1.001	0.0	0.000
0.0	1653.6	1.075	88.4	0.221
1.0	1646.5	1.070	201.4	0.504
2.0	1673.6	1.088	370.4	0.926
3.0	1687.9	1.097	218.8	0.547
4.0	1678.6	1.091	227.7	0.569
5.0	1700.6	1.105	259.8	0.649
6.0	1695.9	1.102	259.8	0.649
7.0	1708.2	1.110	291.6	0.729
8.0	1711.1	1.112	271.7	0.679
9.0	1675.9	1.089	229.2	0.573
10.0	1667.2	1.084	271.7	0.679
11.0	1666.7	1.083	351.1	0.878
12.0	1732.0	1.126	706.8	1.767
13.0	1679.1	1.091	602.6	1.507
14.0	1684.2	1.095	463.0	1.158
15.0	1687.4	1.097	536.4	1.341
16.0	1697.3	1.103	448.0	1.120

Cruise: TBAC Station: LTB4-4 date: 4 JUN 95
lat: 27-33.00 N long: 82-40.00 W depth: 5 m

calc for: 27.7 deg C 34.0 o/oo 5.0 m 400 kHz
ref core: 26.9 deg C 82.59 delta-t 290.6 H 0.001 V/D
smp core: 34.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1537.0	0.999	0.0	0.000
0.0	1651.4	1.073	127.4	0.319
1.0	1712.1	1.113	265.6	0.664
2.0	1698.3	1.104	184.2	0.461
3.0	1688.4	1.097	209.2	0.523
4.0	1695.0	1.102	257.9	0.645
5.0	1702.1	1.106	213.3	0.533
6.0	1733.5	1.127	320.4	0.801
7.0	1762.5	1.145	200.2	0.500
8.0	1760.5	1.144	201.4	0.504

Cruise: TBAC Station: LTB5-1 date: 6 JUN 95
lat: 27-32.99 N long: 82-39.99 W depth: 4 m

calc for: 27.9 deg C 33.0 o/oo 4.0 m 400 kHz
ref core: 27.0 deg C 82.62 delta-t 303.1 H 0.001 V/D
smp core: 33.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1538.3	1.000	4.5	0.011
0.0	1546.9	1.006	143.1	0.358
1.0	1677.8	1.091	223.4	0.559
2.0	1677.8	1.091	219.3	0.548
3.0	1687.6	1.097	239.8	0.600
4.0	1690.9	1.099	258.4	0.646
5.0	1717.0	1.116	299.9	0.750
6.0	1740.5	1.132	297.6	0.744
7.0	1747.0	1.136	269.6	0.674

Cruise: TBAC Station: LTB5-2 date: 6 JUN 95
lat: 27-32.99 N long: 82-39.99 W depth: 4 m

calc for: 27.9 deg C 33.0 o/oo 4.0 m 400 kHz
ref core: 26.0 deg C 82.52 delta-t 303.1 H 0.001 V/D
smp core: 33.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1534.0	0.997	0.0	0.000
0.0	1536.3	0.999	195.7	0.489
1.0	1655.3	1.076	226.3	0.566
2.0	1691.4	1.100	288.4	0.721
3.0	1694.2	1.102	202.5	0.506
4.0	1678.0	1.091	262.0	0.655
5.0	1681.7	1.093	253.1	0.633
6.0	1692.4	1.100	251.4	0.628
7.0	1691.0	1.099	265.8	0.664
8.0	1697.5	1.104	315.2	0.788
9.0	1706.1	1.109	341.7	0.854
10.0	1710.4	1.112	372.3	0.931
11.0	1694.7	1.102	406.1	1.015
12.0	1697.5	1.104	477.1	1.193
13.0	1685.4	1.096	351.8	0.879
14.0	1670.6	1.086	428.0	1.070

Cruise: TBAC Station: EK1-2 date: 6 JUN 95
lat: 27-37.49 N long: 82-51.00 W depth: 8 m

calc for: 27.9 deg C 35.0 o/oo 8.0 m 400 kHz
ref core: 26.1 deg C 82.55 delta-t 306.2 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1538.3	0.999	0.0	0.000
0.0	1546.9	1.004	155.0	0.387
1.0	1613.0	1.047	448.5	1.121
2.0	1692.5	1.099	292.1	0.730
3.0	1701.9	1.105	271.1	0.678
4.0	1694.3	1.100	423.6	1.059
5.0	1672.1	1.086	480.7	1.202
6.0	1650.4	1.072	437.1	1.093
7.0	1640.7	1.065	415.4	1.039
8.0	1631.9	1.060	340.0	0.850
9.0	1632.8	1.060	267.2	0.668
10.0	1647.8	1.070	294.4	0.736
11.0	1659.4	1.077	299.0	0.748
12.0	1668.4	1.083	346.5	0.866
13.0	1654.9	1.074	310.1	0.775
14.0	1669.3	1.084	319.4	0.799

Cruise: TBAC Station: EK1-1 date: 6 JUN 95
lat: 27-37.49 N long: 82-51.00 W depth: 8 m

calc for: 27.9 deg C 35.0 o/oo 8.0 m 400 kHz
ref core: 26.5 deg C 82.56 delta-t 306.2 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1538.7	0.999	4.4	0.011
0.0	1651.9	1.072	95.8	0.240
1.0	1771.6	1.150	146.6	0.367
2.0	1771.1	1.150	178.4	0.446
3.0	1733.4	1.125	360.3	0.901
4.0	1670.8	1.085	299.0	0.748
5.0	1653.7	1.074	271.1	0.678
6.0	1669.9	1.084	299.0	0.748
7.0	1667.7	1.083	308.9	0.772
8.0	1666.7	1.082	367.8	0.920
9.0	1658.6	1.077	501.3	1.253
10.0	1660.4	1.078	557.9	1.395
11.0	1659.0	1.077	327.8	0.820
12.0	1661.3	1.079	281.2	0.703
13.0	1654.6	1.074	292.1	0.730
14.0	1653.2	1.073	267.2	0.668

Cruise: TBAC Station: EK1-3 date: 6 JUN 95
lat: 27-37.49 N long: 82-51.00 W depth: 8 m

calc for: 27.9 deg C 35.0 o/oo 8.0 m 400 kHz
ref core: 26.0 deg C 82.56 delta-t 306.2 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1537.1	0.998	0.0	0.000
0.0	1651.7	1.072	170.9	0.427
1.0	1761.1	1.143	166.2	0.416
2.0	1755.1	1.139	232.1	0.580
3.0	1673.4	1.086	316.7	0.792
4.0	1658.9	1.077	258.1	0.645
5.0	1650.8	1.072	275.0	0.688
6.0	1638.5	1.064	254.6	0.636
7.0	1658.9	1.077	400.1	1.000
8.0	1621.1	1.053	426.6	1.066
9.0	1633.2	1.060	351.5	0.879
10.0	1660.7	1.078	390.8	0.977

Cruise: TBAC Station: EK1-4 date: 6 JUN 95
lat: 27-37.49 N long: 82-51.00 W depth: 8 m

calc for: 27.9 deg C 35.0 o/oo 8.0 m 400 kHz
ref core: 26.0 deg C 82.57 delta-t 306.2 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1537.1	0.998	-1.4	-0.004
0.0	1544.1	1.003	56.3	0.141
1.0	1763.6	1.145	183.6	0.459
2.0	1752.5	1.138	277.1	0.693
3.0	1726.7	1.121	219.3	0.548
4.0	1734.1	1.126	173.4	0.433
5.0	1732.6	1.125	448.5	1.121
6.0	1649.4	1.071	319.4	0.799
7.0	1647.7	1.070	333.8	0.834
8.0	1648.5	1.070	325.0	0.812
9.0	1650.3	1.071	379.9	0.950
10.0	1658.4	1.077	462.7	1.157
11.0	1669.2	1.084	534.2	1.336
12.0	1651.2	1.072	320.8	0.802
13.0	1654.8	1.074	329.3	0.823
14.0	1662.0	1.079	325.0	0.812

Cruise: TBAC Station: EK2-1 date: 7 JUN 95
lat: 27-37.48 N long: 82-50.50 W depth: 7 m

calc for: 28.1 deg C 35.0 o/oo 7.0 m 400 kHz
ref core: 28.0 deg C 82.66 delta-t 293.8 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1539.2	0.999	-3.0	-0.007
0.0	1654.4	1.074	97.2	0.243
1.0	1760.0	1.142	191.5	0.479
2.0	1753.4	1.138	183.0	0.458
3.0	1763.6	1.145	180.3	0.451
4.0	1775.9	1.153	230.7	0.577
5.0	1758.0	1.141	279.5	0.699
6.0	1665.3	1.081	267.1	0.668
7.0	1796.8	1.166	226.2	0.565
8.0	1802.1	1.170	269.1	0.673
9.0	1674.4	1.087	394.2	0.985

Cruise: TBAC Station: EK2-2 date: 7 JUN 95
lat: 27-37.48 N long: 82-50.50 W depth: 7 m

calc for: 28.1 deg C 35.0 o/oo 7.0 m 400 kHz
ref core: 26.8 deg C 82.59 delta-t 300.0 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1538.3	0.998	1.5	0.004
0.0	1775.8	1.153	200.4	0.501
1.0	1761.9	1.144	152.0	0.380
2.0	1772.7	1.151	168.0	0.420
3.0	1781.0	1.156	158.7	0.397
4.0	1782.5	1.157	154.2	0.386
5.0	1778.9	1.155	163.3	0.408
6.0	1765.5	1.146	243.2	0.608
7.0	1747.3	1.134	233.7	0.584
8.0	1747.3	1.134	243.2	0.608
9.0	1719.8	1.116	236.8	0.592
10.0	1744.8	1.133	293.7	0.734
11.0	1731.5	1.124	341.9	0.855
12.0	1706.3	1.108	335.5	0.839
13.0	1710.1	1.110	293.7	0.734
14.0	1704.4	1.106	452.5	1.131
15.0	1711.1	1.111	484.3	1.211

Cruise: TBAC Station: EK2-3 date: 7 JUN 95
lat: 27-37.48 N long: 82-50.50 W depth: 7 m

calc for: 28.1 deg C 35.0 o/oo 7.0 m 400 kHz
ref core: 26.8 deg C 82.60 delta-t 287.5 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1537.5	0.998	-3.1	-0.008
0.0	1773.2	1.151	188.4	0.471
1.0	1758.4	1.141	143.8	0.360
2.0	1747.8	1.134	143.8	0.360
3.0	1748.8	1.135	159.6	0.399
4.0	1758.4	1.141	169.4	0.423
5.0	1766.0	1.146	139.7	0.349
6.0	1763.5	1.145	157.2	0.393
7.0	1751.8	1.137	162.0	0.405
8.0	1753.3	1.138	171.9	0.430
9.0	1734.9	1.126	254.5	0.636
10.0	1726.1	1.120	274.3	0.686
11.0	1702.0	1.105	305.0	0.763
12.0	1702.0	1.105	270.1	0.675

Cruise: TBAC Station: EK2-4 date: 7 JUN 95
lat: 27-37.48 N long: 82-50.50 W depth: 7 m

calc for: 28.1 deg C 35.0 o/oo 7.0 m 400 kHz
ref core: 26.7 deg C 82.59 delta-t 303.1 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1538.8	0.999	3.0	0.007
0.0	1777.9	1.154	176.9	0.442
1.0	1764.5	1.145	145.1	0.363
2.0	1762.0	1.144	151.4	0.378
3.0	1775.3	1.152	167.1	0.418
4.0	1787.2	1.160	147.2	0.368
5.0	1788.8	1.161	153.5	0.384
6.0	1780.5	1.156	167.1	0.418
7.0	1761.5	1.143	219.3	0.548
8.0	1754.4	1.139	201.3	0.503
9.0	1738.4	1.128	254.8	0.637
10.0	1750.9	1.136	275.6	0.689
11.0	1726.6	1.121	317.9	0.795
12.0	1714.5	1.113	490.3	1.226
13.0	1733.0	1.125	408.6	1.022
14.0	1729.1	1.122	271.6	0.679
15.0	1744.4	1.132	279.8	0.699
16.0	1740.9	1.130	317.9	0.795
17.0	1711.1	1.111	414.0	1.035

Cruise: TBAC Station: IRB5-1 date: 3 JUN 95
lat: 27 55.96 N long: 82-52.65 W depth: 4 m

calc for: 28.6 deg C 35.0 o/oo 4.0 m 400 kHz
ref core: 24.5 deg C 82.60 delta-t 290.6 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1540.3	0.999	0.0	0.000
0.0	1651.9	1.072	170.9	0.427
1.0	1767.1	1.146	149.7	0.374
2.0	1782.5	1.156	131.2	0.328
3.0	1784.6	1.158	125.6	0.314
4.0	1785.1	1.158	125.6	0.314
5.0	1787.2	1.159	135.1	0.338
6.0	1791.3	1.162	123.7	0.309

Cruise: TBAC Station: IRB5-2 date: 3 JUN 95
lat: 27-55.96 N long: 82-52.65 W depth: 4 m

calc for: 28.6 deg C 35.0 o/oo 4.0 m 400 kHz
ref core: 24.5 deg C 82.56 delta-t 290.6 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1540.3	0.999	0.0	0.000
0.0	1652.8	1.072	165.9	0.415
1.0	1772.7	1.150	116.6	0.292
2.0	1780.4	1.155	131.2	0.328
3.0	1776.8	1.153	120.1	0.300
4.0	1775.8	1.152	120.1	0.300
5.0	1774.2	1.151	139.1	0.348
6.0	1763.5	1.144	133.2	0.333
7.0	1767.6	1.147	135.1	0.338
8.0	1775.3	1.152	131.2	0.328
9.0	1781.5	1.156	143.3	0.358
10.0	1766.1	1.146	158.8	0.397
11.0	1767.1	1.146	173.5	0.434
12.0	1765.6	1.145	220.3	0.551
13.0	1761.0	1.142	267.6	0.669
14.0	1744.0	1.131	314.7	0.787

Cruise: TBAC Station: IRB5-3 date: 3 JUN 95
lat: 27-55.96 N long: 82-52.65 W depth: 4 m

calc for: 28.6 deg C 35.0 o/oo 4.0 m 400 kHz
ref core: 24.5 deg C 82.54 delta-t 290.6 H 0.001 V/D
smp core: 35.0 o/oo 6.1 cm thickness

Depth (cm)	Vp(m/SEC)	Vp RATIO	ALPHA(dB/m)	k
-1.0	1539.6	0.999	0.0	0.000
0.0	1647.5	1.069	207.9	0.520
1.0	1771.7	1.149	143.3	0.358
2.0	1778.9	1.154	123.7	0.309
3.0	1775.8	1.152	127.4	0.319
4.0	1766.6	1.146	137.1	0.343
5.0	1761.5	1.143	137.1	0.343
6.0	1767.6	1.147	133.2	0.333
7.0	1771.2	1.149	123.7	0.309
8.0	1771.2	1.149	141.2	0.353
9.0	1772.7	1.150	137.1	0.343
10.0	1775.3	1.152	129.3	0.323
11.0	1781.5	1.156	131.2	0.328
12.0	1774.8	1.151	151.9	0.380
13.0	1765.1	1.145	151.9	0.380
14.0	1759.5	1.141	181.5	0.454